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ABSTRACT

This proceedings contains 18 papers on agricultural research issues selected by panel review plus the keynote address, a conference summary, and the conference agenda. The following papers are included: "Research in Agricultural Education: Requisites for Further Progress" (Warmbrod--keynote address); "Marketing Agricultural Education" (Casey, Leske, Krueger); "Attitudes of Nebraska Superintendents, Principals, and Vocational Agriculture Instructors about the Delivery of Adult Education through Secondary Vocational Agriculture Programs" (Adelaine, Foster); "College Administrators' Image of the Agricultural Teacher Education Programs: A National Study" (Miller, Dlamini, Crunkilton, Lee); "Computer Skills Needed by Secondary Agribusiness Students" (Henderson, Newman); "Evaluation of a Microcomputer Simulation Teaching Strategy" (McCaskey, Birkenholz, Stewart); "Evaluation of a Statewide Pilot Project to Integrate an Online Agricultural Information Network into the Classroom" (Peters, Pershing); "The Teaching Performance of Graduates of Teacher Education Programs in Vocational and Technical Education and Their Decision to Teach" (Warclow); "Factors Associated with the Problem-Solving Ability of High School Students Enrolled in Vocational Horticulture" (Chautong, Warmbrod); "Levels of Cognition of Testing and Student Assignments in the College of Agriculture, The Ohio State University" (Newcomb, Trefz); "Professional Competencies Needed by Beginning Cooperative Extension Agricultural Agents in Minnesota, North Dakota, and South Dakota" (Luft and Keita); "Delivery of Adult Agricultural Education: A Case Study" (Miller, Cano); "Attitudes toward Competition in a Youth Organization: A Case Study" (Smith, Rohrer, Collins); "Increased Secondary Graduation Requirements: Their Influence on Vocational Agriculture and Vocational Education Programs in Washington" (Simon, Kleene); "Current Status of Women Teachers of Vocational Agriculture in Ohio and Their Perceptions of Their Place in the Profession" (Knight); "Impact of the Minority Apprenticeship Program Experience on Selection of a Major Preference in the College of Agriculture and Natural Resources by Minority Freshmen at Michigan State University" (Wallace); "A Follow-up Evaluation of a Fruit and Vegetable Program for Vocational Agriculture Teachers" (Gamon, Burton); "Safety Assessment of North Dakota Vocational Agriculture Mechanics Programs" (Priebe, Nichols); "Workshop Effect on Curriculum Implementation" (Mullinix, Weston, Linhardt); and "Conference Summary and Planning for 1988" (Moore). (MN)

ERIC

Proceedings of the

CENTRAL REGION

41st

ANNUAL RESEARCH CONFERENCE in AGRICULTURAL EDUCATION

February 22 - 23, 1987

Chicago, Illinois

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FOREWORD

Quality research is essential to progress in any profession. This is the basic tenet under which professionals in Agricultural and Extension Education have conducted regional and national research conferences.

Planning for the Central Region 41st Annual Research Conference in Agricultural Education, was initiated by faculty in the Department of Agricultural and Extension Education, Michigan State University, during the Fall of 1986. The information and advice received from Drs. Lonell L. Moeller and Clark W. Hanson, South Dakota State University, were very valuable. Drs. Moeller and Hanson served as Co-Chairpersons of the Central Region 40th Annual Research Conference in Agricultural Education. I thank them for their support.

As a result of an announcement for a call for research paper proposals, thirty-eight proposals were submitted. The paper proposals were reviewed by a panel of reviewers who are employed by universities outside of the Central Region. The reviewers were:

Dr. Jasper S. Lee, Professor and Head
Department of Agricultural and Extension Education
Mississippi State University

Dr. Gary E. Moore, Professor
Agricultural, Extension and
International Education
Louisiana State University

Dr. J. Dale Oliver, Professor
Division of Vocational and
Technical Education
Virginia Polytechnic Institute
and State University

A special thanks is due to the previous mentioned individuals who served as referees and whose work provided the basis for the objective selection of presenters. Eighteen of the 38 proposals submitted were selected for a 47 percent acceptance rate. Appreciation is extended to all individuals of the profession who submitted proposals and permitted their work to be judged by peers.

Dr. J. Robert Warmbrod, Professor, Department of Agricultural Education, The Ohio State University was the keynote speaker. His presentation titled "Research in Agricultural Education: Requisites for Further Progress" was thought provoking. Even though the agricultural education profession has made progress during the last two decades relative to research, he clearly outlined a number of important requisites needed for further progress. He also challenged the conference participants to

recommit themselves to excellence and scholarship in the planning, conducting, reporting and use of research. We thank him for an excellent keynote address.

Appreciation is extended to all speakers, reactors, and chairpersons. Their efforts resulted in an excellent conference. Finally, thanks is due to Michael Smith, Specialist, Department of Agricultural and Extension Education, Michigan State University, for designing the covers for the conference program and Proceedings.

I hope that the papers from the Central Region 41st Annual Research Conference in Agricultural Education, will prove useful to all who receive them and that all presenters will submit their work for possible publication in a journal. It is time to begin preparing for the 42nd Conference, and I hope that many of you will submit paper proposals for consideration to the Chairman of the 1988 Central States Agricultural Education Research Conference.

Eddie A. Moore, Chairman
Central Region 41st Annual
Research Conference in Agricultural
Education

PROGRAM

41st ANNUAL CENTRAL STATES RESEARCH CONFERENCE
IN
AGRICULTURAL EDUCATION

Best Western Inn of Chicago
Chicago, Illinois
February 22-23, 1987

Conference Chairperson: Eddie A. Moore
Michigan State University

Sunday, February 22, 1987

5:30-6:30 p.m. Registration - Chicago I

Jonathon Landeck, Michigan State University
Eddie A. Moore, Michigan State University

FIRST SESSION
Chicago I

6:30-6:45 p.m. Conference Overview

Eddie A. Moore, Michigan State University

Chairperson: O. Donald Meaders
Michigan State University

6:45-7:45 p.m. Keynote Address - Research in Agricultural Education: Requisites for Further Progress

J. Robert Warmbrod, Professor
Department of Agricultural Education
The Ohio State University

Reactors:

7:45-8:00 p.m. Earl Russell, University of Illinois

8:00-8:15 p.m. Roland Peterson, University of Minnesota

8:15-8:30 p.m. David Williams, Iowa State University

8:30-9:15 p.m. Question and Answer Session

Monday, February 23, 1987

7:30-8:00 a.m. Late Registration - Chicago I

Jonathon Landeck, Michigan State University
Eddie A. Moore, Michigan State University

SECOND SESSION
Concurrent Session A
Chicago I

8:00-9:40 a.m. Theme: Marketing Agricultural Education

Chairperson: Osmund S. Gilbertson,
University of Nebraska

Reactor: Ed Osborne, University of Illinois

Topic I: Marketing Agricultural Education

Mary Anne Casey, Gary Leske, Richard Krueger, University of Minnesota

Topic II: Attitudes of Nebraska Superintendents, Principals and Vocational Agriculture Instructors About the Delivery of Adult Education Through Secondary Vocational Agriculture Programs

Michael F. Adelaine and
Richard M. Foster, University of Nebraska

Topic III: College Administrators' Image of the Agricultural Teacher Education Programs: A National Study

Larry E. Miller and Marietta P. Dlamini,
The Ohio State University

John R. Crunkilton,
Virginia Polytechnic Institute and State University

Jasper S. Lee,
Mississippi State University

Concurrent Session B
Chicago II

8:00-9:40 a.m. Theme: Computers in Agriculture and Agricultural Information Network

Chairperson: Harrison Gardner
Michigan State University

Reactor: Roy Dillon,
University of Nebraska

Topic I: Computer Skills
Needed by Secondary Agribusiness Students

Janet L. Henderson,
The Ohio State University

Michael E. Newman,
East Central High School
Hurley, Mississippi

Topic II: Evaluation of A Microcomputer
Simulation Teaching Strategy

Michael J. McCaskey,
Robert J. Birkenholz,
Bob R. Stewart, University of Missouri-Columbia

Topic III: Evaluation of A Statewide Pilot Project
to Integrate an Online Agricultural
Information Network into the Classroom

Jerry L. Peters, Purdue University

Jim Pershing, Indiana University

Concurrent Session C
Chicago IV

8:00-9:40 a.m. Theme: Teaching and the Teaching Profession

Chairperson: W. Wade Miller,
Iowa State University

Reactor: Gordon Swanson,
University of Minnesota

Topic I: The Teaching Performance of Graduates of Teacher Education Programs in Vocational and Technical Education and Their Decision to Teach

George Wardlow,
University of Minnesota

Topic II: Factors Associated with the Problem Solving Ability of High School Students Enrolled in Vocational Horticulture

Pongpan Chuatong, J. Robert Warmbrod,
The Ohio State University

Topic III: Levels of Cognition of Testing and Student Assignments in the College of Agriculture, The Ohio State University

L.H. Newcomb, Marilyn K. Trefz, The Ohio State University

9:40-9:55 a.m. BREAK

THIRD SESSION
Concurrent Session D
Chicago I

9:55-11:30 a.m. Theme: Competencies Needed by Beginning Extension Agents and the Extent to Which Clientele Needs are Being Met

Chairperson: Roger Steele,
Michigan State University

Reactor: Edgar Persons
University of Minnesota

Topic I: Professional Competencies Needed by Beginning Cooperative Extension Agricultural Agents in Minnesota, North Dakota, and South Dakota

Vernon D. Luft and Dougou Keita, North Dakota State University

Topic II: Delivery of Adult Agricultural Education: A Case Study

Larry E. Miller and
Jamie Cano, The Ohio State University

Topic III: Attitudes Toward Competition in a Youth Organization: A Case Study

Keith L. Smith, John Rohrer and Christy Collins, The Ohio State University

Concurrent Session E
Chicago II

9:55-11:30 a.m. Theme: Trends, Issues and Challenges

Chairperson: Fred Reneau,
Southern Illinois University

Reactor: John Thompson,
University of Wisconsin-Madison

Topic I: Increased Secondary Graduation Requirements: Their Influence on Vocational Agriculture and Vocational Education Programs in Washington

Jerry Simon, University of Minnesota

Marvin D. Kleene, Washington State University

Topic II: Current Status of Women Teachers of Vocational Agriculture in Ohio and Their Perceptions of Their Place in the Profession

James A. Knight, The Ohio State University

Topic III: Impact of the Minority Apprenticeship Program Experience on Selection of a Major Preference in the College of Agriculture and Natural Resources by Minority Freshmen at Michigan State University

Donald Wallace, Michigan State University

Concurrent Session F
Chicago IV

9:55-11:30 a.m. Theme: Evaluating and Assessing Agricultural Education Efforts

Chairperson: Clark Hanson, North Dakota State University

Reactor: Robert Martin
Iowa State University

Topic I: A Follow-up Evaluation of A Fruit and Vegetable Inservice Program for Vocational Agriculture Teachers

Julia Gamon, Iowa State University

L. DeVere Burton, Idaho State University

Topic II: Safety Assessment of North Dakota Vocational Agriculture Mechanics Programs

Donald Priebe, North Dakota State University

David Nichols, Climax High School, Minnesota

Topic III: Workshop Effect on Curriculum Implementation

Mark K. Mullinix, Wenatchee Valley College

Curtis R. Weston and Richard E. Linhardt, University of Missouri-Columbia

FOURTH SESSION
Chicago I

11:30-11:45 a.m. Conference Summary and Planning for 1988

Chairperson: Eddie A. Moore
Michigan State University

11:45 a.m. Adjourn

RESEARCH IN AGRICULTURAL EDUCATION: REQUISITES FOR FURTHER PROGRESS*

J. Robert Warmbrod, Professor
Department of Agricultural Education
The Ohio State University

Basic to what I propose as requisites for further progress in research in agricultural education is the proposition that we have made substantial progress during the past 10 to 15 years in our research efforts. I will highlight some arguments and evidence to substantiate this proposition; however, I want to concentrate on a second and more important thesis. If progress is to continue, we must give high priority to a number of factors that are necessary for further improvement in research in agricultural education. The major part of the presentation, then, is a description of what I call requisites for further progress. First, what are some arguments supporting the proposition that particularly during the past 10 to 15 years there has been noticeable progress in research in agricultural education? The most convincing case I can present is to contrast the nature of higher education in agricultural education experienced by the entering assistant professor today with that experienced by a person entering one or two decades ago. For me, the contrast is sharp when I compare higher education in agricultural education that the new assistant professor of the 1980s finds to what was experienced by new assistant professors in the 1960s and the 1970s.

Today, research in agricultural education is a more visible and, I think, a more viable part of agricultural education. In most cases, beginning assistant professors of the 1980s have received more formal study and experience as graduate students in the planning, conduct and reporting of research than was the case for the beginning assistant professors in the 1960s and 1970s. Also, a person's progress and recognition within the profession, as well as an individual's promotion and progress within the university, are clearly more contingent on research competence and performance for those beginning their careers in higher education in the 1980s than was the case for those who entered higher education one or two decades earlier.

Those entering higher education in agricultural education today not only have immediate opportunities, but are expected, to present papers to regional and national research conferences and to publish in refereed journals. Not only is it likely but the time is fast approaching when it will almost be a necessity for the beginning assistant professor to have published or presented a refereed research paper or papers as a graduate student. Within the areas of specialization in agricultural education, persons entering the profession today have opportunities to publish in the Journal of the American Association of Teacher Educators in Agriculture, the Journal of Extension, the NACTA Journal, the Journal of Vocational Education Research, and the Journal of Vocational and

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*Presented at the Central States Research Conference in Agricultural Education, Chicago, February 22, 1987.

Technical Education. The opportunity to present refereed research papers at regional and national research conferences is essentially a phenomenon of the past decade. My point is that these means of publicly presenting research that has been examined critically by colleagues provide evidence of the maturity and progress in research in agricultural education.

Additional evidence of progress is the fact that faculty members are more visible and productive as researchers. Even though much of the research continues to be conducted by graduate students, there is no doubt that faculty members are more active producers of research as well as advisers of graduate students' research than was the case several years ago. Clearly, graduate programs in agricultural education place more emphasis on competence in research methodology, data analysis and reporting of research than was the case previously. This contributes, I contend, to considerable improvement in the methodological and technical aspects of research. What agricultural education researcher--whether graduate student, beginning assistant professor or tenured professor--would dare submit a research article or paper to the Journal of the AATEA, to this research conference, or to the National Agricultural Education Research Meeting that ignored technical considerations such as internal and external validity, validity and reliability of instruments, nonresponse and the assumptions and appropriateness of statistical analysis procedures?

Higher expectations for research competence and performance by faculty members, more opportunities to publish and present research, the initiation of peer review of research, and noticeable improvement in the methodological and technical aspects of research support the proposition that significant progress has been made in research in agricultural education during the past two decades. I add quickly, however, that these indicators of progress emphasize quantitative and methodological dimensions in contrast to the substantive dimensions of research in agricultural education. As persons who have major interest and expertise in research, perhaps we should consider seriously the counter proposition that demonstrated progress in the quantitative dimension of research has been accompanied by a lack of progress--if not waning interest and attention--in the more substantive dimensions of scholarship in agricultural education such as philosophical and historical concerns, theoretical and conceptual underpinning for research, the significance and importance of issues we investigate, the cumulative effects of research, and the contribution of research to policy and program development.

With that background, I now turn to a second proposal, namely, that a number of factors warrant our undivided attention if substantial further progress is to be forthcoming. I will present what I describe as requisites for further progress in two major categories. First, there is a series of concerns that pertain to the significance and importance of what we research. The second category of requisites for further progress includes factors that encourage faculty to conduct research and to develop as researchers as well as institutional factors that encourage and contribute positively to research performance.

I propose that our highest priority for further progress must be that we pay more attention to the significance and importance of the problems and issues we research. The late H. M. Hamlin wrote more than 20 years ago, "Ideas and concepts are the first requisite for good research. . . . Research without important ideas is busy work." I contend that this quotation identifies our most important challenge for further progress. Stated directly and simply, we must pay more attention to what we research. It is relatively easy, in my opinion, to develop a convincing argument that the progress during the past two decades that I described earlier has not been accompanied by comparable attention to and advancement in the importance and significance of the substance--the content--of our research. So it is essential that we renew efforts to concentrate purposefully on researching important and significant problems and issues that pertain directly to the vital core of agricultural education--specifically, teaching, learning, human development, leadership, communication and institutions and policy pertaining to agricultural education in its broadest sense. Also, we need to broaden our definition of agricultural education to include, in addition to vocational agriculture, extension education, nonvocational education in agriculture, communications, postsecondary education, and agricultural education in higher education.

Occasionally we confuse the significance and importance of a problem or issue with the research methodology used to investigate the problem. The significance and importance of a problem hinges on the extent to which it addresses crucial and difficult problems, on the likelihood that new knowledge will be generated, on the extent to which the research will clarify and expand theory and cumulative knowledge, on the efficacy of the research to explain strengths and weaknesses of current policy and practice, and on the extent to which the research is likely to yield results that contribute to the development of new and revised policies and practices. It is the nature of the problem and the end sought from the investigation that establish criteria against which to judge the adequacy of the methodology, rather than the methodology employed determining the significance and importance of the problem or issue being investigated. All methodologies for systematic inquiry--including empirical, naturalistic, historical and philosophical--are viable candidates. Appraisal of the significance and importance of research problems in a given area of specialization is largely judgmental, best made by persons whose expertise is the substantive area in which the researcher is being conducted.

In calling for more attention to the significance and importance of problems and issues that we investigate, we need to be aware of the fact that research in agricultural education will rarely be considered of major import if it is evident that the researcher is naive about the major ideas, concepts and theoretical constructs basic to the topic being researched. Problems in agricultural education cannot be researched competently unless the connection is made explicit between what is being investigated and pertinent theory and empirical knowledge. This requires the researcher to have more than a casual acquaintance with the theory and related research that is basic to the investigation. A thorough knowledge of theory and related research that is basic

to a particular investigation may well be a major factor that differentiates the research "scholar" from the research "technician."

The first corollary, then, of the call for more attention to the importance and significance of research in agricultural education is that we must draw more directly upon pertinent theory and research in the social and behavioral sciences, in education, and in some situations agriculture. When that is the case, the importance and significance of the problems and issues investigated are strengthened, and the potential for a cumulative contribution to knowledge generation and the confirmation and refinement of theory is advanced. Additionally, careful attention to theory and knowledge that undergird problems being investigated provides caution against a tendency sometimes evident in agricultural education research of attempting to oversimplify very complicated phenomena.

Building a theoretical or knowledge base is a gradual and cumulative process. A legitimate criticism of research in agricultural education is that it is conducted frequently in isolated, fragmented segments. This leads to a second corollary accompanying the proposition that a requisite for further progress is more attention to the significance and importance of what we investigate. Corollary two is: research in agricultural education must be more programmatic. Researchers do not become scholars by studying unrelated topics each year. Significant and important topics are not researched competently and thoroughly with one study. The generation of cumulative knowledge requires, almost by definition, a series of related studies. If policy and program changes are to be based on research, the case for improvement and change will invariably require a broader and more valid research base than usually results from fragmented and isolated studies. A high priority for continuing progress in research in agricultural education is emphasis on programmatic research both by individual faculty members and by universities.

Now for corollary three accompanying the requisite for further progress that proposes we place high priority on the significance and importance of the problems and issues that are investigated. It is imperative that we make more concerted and systematic efforts to synthesize the knowledge we have generated from research in agricultural education. I am not criticizing the Review and Synthesis of Research in Agricultural Education series published periodically by the National Center for Research in Vocational Education, the ten-year reviews in the Encyclopedia of Educational Research, or other reviews. It is impossible to digest and synthesize in one publication or one article what has been learned from research in all areas of agricultural education. What I am touting is that for several of the significant areas of agricultural education--for example, supervised occupational experience, student organizations, or methods of teaching--we accumulate, critically analyze and synthesize, and report the valid knowledge that has been generated. What have we learned from the vast number of studies on these and other topics during the past 10 to 20 years? Are we accumulating a valid knowledge base that contributes to policy and program development and to further research? Not only will these reports of what we know, or perhaps what we do not know, be a boon for further

progress in research, but think of its value for instruction that is more research-based for both undergraduate and graduate students.

A fourth corollary accompanying the significance and importance requisite for further progress logically follows. We must put more effort and resources into using the findings of research to develop and revise policies and programs. We must place higher priority on translating what we learn from research into recommendations for program and policy change. In too many cases, our research efforts end with the writing of a report that usually takes the form of a thesis or dissertation placed on a library shelf or a published journal article. More attention to implementing the findings of research has double benefits. Policies and programs are improved, and other significant and important problem areas appear that require further study and investigation.

Now I want to concentrate on a second category of requisites for further progress. This category includes factors that encourage faculty members to conduct research and develop as researchers and to institutional factors that contribute positively to further progress in research in agricultural education. This category of requisites for further progress focuses on factors that must accompany the requisite for enhanced significance and importance of research. Unless we also give high priority to these personnel and institutional requisites, progress relative to the requisite already described will be meager, if there is to be further progress at all.

Before offering specific proposals within this category, I want to highlight briefly some research findings regarding the research performance of faculty members (Warmbrod, 1986). Those who study the research performance of faculty members conclude that development of faculty members as researchers begins in graduate school. The research is quite clear that graduate programs develop the skills needed by the competent researcher and socialize the potential faculty member to the norms and values of the profession (Creswell, 1985). Kelly's (1982) study of the research productivity of vocational education faculty members in six universities confirms that this generalization holds for faculty members in agricultural education.

An important factor in research performance is a faculty member's expressed interest in and motivation to do research. There is evidence that differences in research performance among faculty members reflect research interest, that both faculty members' interest in research and their research performance are positively correlated with ratings of quality of an institution, and that there is a strong positive relationship between time spent doing research and expressed interest in research (Yuker, 1984). The following statements summarize the research regarding research performance of faculty members and the environment and conditions within which faculty members work (Creswell, 1985):

- Psychological and individual attributes of faculty members hold less explanatory power regarding research performance than do sociological and work-environment correlates.

- Resources contribute to a productive research career. Typically, high quality institutions have access to money, provide time for faculty research, make available competent research assistants, have stimulating colleagues for faculty, provide easy access to information, and provide secretarial services and computer time. All of these factors contribute to high research performance by faculty.

- If faculty are to be high research performers, the faculty load must include time assigned for research. There is some evidence that spending too much or too little work time on research may impede performance. One recommendation is that time assigned for research should not exceed 80% or be less than 20%; somewhere around 40% is considered optimum.

- High research producers are individuals who maintain a continuous line of research during their careers.

- Productive researchers are persons who maintain regular contacts with colleagues, both within and outside the institution where they are employed. Interpersonal contacts such as collaboration on projects, personal contact, telephone conversations, correspondence and receipt of unpublished papers seem to influence research more significantly than impersonal contacts such as reading journals and presenting papers at formal meetings. Role models and senior faculty collaborating with junior faculty on research contribute significantly to research performance.

- Reinforcement is an important explanation for research performance. Reinforcement occurs through publishing. Being cited in the writings of others, being contacted for copies of articles and presentations, being asked to appear on programs and being sought out by graduate students are important motivating factors. Appreciative department chairs, college and university administrators and faculty colleagues provide an environment that stimulates research performance.

- The attitude and atmosphere of a department and university are important in stimulating high research performance among faculty.

Drawing upon this framework of what we know about institutional and personal factors that enhance research performance, I will emphasize three requisites for further progress. First, it is imperative that faculty members be allocated time to plan and conduct research. Further progress for research in agricultural education requires that faculty members have time specifically allocated for research, which in turn means that teaching and service loads of individual faculty members must be adjusted. We have been naive too long in believing that we can be productive researchers when our research responsibilities are performed on top of a full load of teaching and service responsibilities. There are few if any faculties in research universities, particularly faculties in colleges of agriculture, that would tolerate the arrangements for research that faculties of agricultural education experience as the routine mode of operation. Kelly's research (Kelly & Warmbrod, 1986)

confirms that faculty members in agricultural education feel that research and scholarship are not emphasized enough and that research performance has not been given a high priority. I am convinced that further progress will be meager unless the research mission of faculties of agricultural education, accompanied by the allocation of faculty time to accomplish that mission, receives as high a priority as the teaching and service missions. To accomplish that goal with current levels of staffing and resources means that reductions have to be made in time commitments and financial resources allocated to teaching and service responsibilities. In dealing with this priority, we should not overlook the alternative of additional staffing and resources to expand and improve the research mission.

The second proposal within this category of requisites for further progress is additional financial resources to support research in agricultural education. The rationale that demands research be a viable function of academic units in land grant and other research-oriented universities applies, without exception, to agricultural education. It follows that funding patterns to support research in other academic units are also applicable to agricultural education. If faculty members in other academic units are allocated time for research as a part of their regular (resident instruction) appointments, then that should be the funding and time allocation pattern for research in agricultural education. If faculty members in other academic units in colleges of agriculture are allocated time for research and receive funding for research from experiment station funds, then that should be the pattern for funding research in agricultural education. The point I want to emphasize is that we must be more aggressive in asserting that agricultural education cannot continue to be the exception to the rule when it comes to allocating financial resources for research, including the assignment of faculty time for research responsibilities. In most universities, agricultural education has been the exception too long, both in terms of its expectations for quality and quantity of research and the resources allocated to support the research mission. I am not arguing that agricultural education be exempt from a requirement to secure outside funding for research. What I am suggesting is that to expect agricultural education to get all or a majority of its funding for research from outside resources is unrealistic and blatantly unfair unless that pattern for research funding is the norm for all academic units.

The third proposal within this category of requisites for further progress is this: we must continue to place high priority on developing further our competence to design, conduct, report and use high quality research. We accomplish this priority through graduate programs that enhance the research knowledge and skill of persons entering the profession and through continuing education for all of us. We must strive to improve our competence to select and define significant and important problems, to be more scholarly in the use of theory and related research, and to become more expert in the methodological and technical aspects of design and statistical analysis.

I conclude with a final requisite for further progress that pervades throughout. That requisite is a recommitment to excellence and

scholarship in the planning, conduct, reporting and use of research. The better we get, the more rigorous must be the standards against which we judge our research. The standards we set must pertain to the significance and importance of what we research and to the theoretical and empirical base for the research as well as to the methodological and statistical appropriateness and accuracy with which the research is executed and reported.

I'll summarize briefly. I began with the proposition that during the past two decades we have made progress in research in agricultural education, particularly in the quantitative and methodological dimensions of research. The proposed requisites for further progress fall into two major categories. The first category of requisites requires that we place high priority on and give careful thought to the significance and importance of the problems and issues we investigate. Corollaries of this proposition include explicit connection between our research and pertinent theory and related research, the call for more programmatic research, the critical analysis and synthesis of research in agricultural education, and a more concerted effort to use research as a basis for policy and program development in agricultural education.

The second category of requisites pertains to factors that encourage faculty members to conduct research and develop as researchers and to institutional factors that contribute positively to research performance. To achieve further progress, faculty members must devote a higher portion of their work time to research with that level of commitment being at least equivalent to time allocations for teaching and service responsibilities. Increased time allocation for faculty for research requires increased financial support for research in agricultural education, especially from regular sources used to fund research in other academic units. Increased time and resources for research requires, also, a renewed commitment on our part to increase further our competence to design, conduct, report and use research. The culmination is a commitment to higher standards for excellence and scholarship in our research. The more progress we make, the better we must be.

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REACTION TO "RESEARCH IN AGRICULTURAL EDUCATION: REQUISITES FOR FURTHER PROGRESS"*

Earl B. Russell, Chairman
Division of Agricultural Education
College of Education
University of Illinois

I commend Bob Warmbrod for his insightful and instructive remarks about how we may proceed to strengthen our research efforts in agricultural education, individually and collectively. This is my first opportunity, I believe, to formally critique Bob since he guided me as major advisor through my doctoral work in 1971, culminating a period when I discovered the excitement of the research process. I will try to be positive and constructive, as he always was in critiquing me!

My comments no doubt contain biases and perspectives which have accumulated over the last 15 years -- the first eight as a full-time researcher in a national R & D center, and the last seven as a faculty member in agricultural education. I will address only a few portions of Bob's paper and will attempt to raise some other issues for consideration.

First, more and clearer evidence would be helpful to support the statement, "In most cases, beginning assistant professors of the 1980s have received more formal study and experience as graduate students in the planning, conduct and reporting of research than was the case for the beginning assistant professors in the 1960s and 1970s." While this may be a true statement, several possible factors in the 1980s may mitigate against this statement. These factors are:

1. Declining federal and state research dollars which are available to agricultural education researchers.

2. Funding policies in recent years favoring general vocational education research rather than specific service area research such as we are interested in in agricultural education.

3. The diversion of "research" funds in some quarters to achieve administrative ends of sponsoring agencies.

Too often, perhaps, in recent years graduate students who become beginning assistant professors of agricultural education receive "research" experience by conducting teacher inservice workshops, writing curriculum materials, or performing administrative (clerical?) duties for professors. Of course, such experiences are valuable, but I'm just raising a question about their appropriateness under "research" funding. (By the way, I'm guilty of some of these sins as a research manager and as a faculty member !)

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*Presented at the Central States Research Conference in Agricultural Education, Chicago, February 22, 1987.

On another point, I was pleased that Bob raised the proposition that at times we might be worrying more about the method of inquiry than the significance or importance of what is investigated. His advice to make better use of theory and previous research, to do programmatic research, to synthesize the knowledge of our field, and to use our findings to change policies and programs -- all of these we need to take to heart and act upon.

Regarding the question of significance and importance of our research, I suggest that we concentrate harder on issue areas we have not aggressively examined as a profession to date. I'm afraid that our research is too often done to justify what we are already doing. Some issue areas I would suggest for disciplined inquiry are:

1. Public and student perceptions of our programs in the public schools, particularly those individuals who are "outsiders," or non-participants in our programs.

2. Curriculum relevance in an age of technological, scientific, and social upheaval in the agricultural sector.

3. Program rigor with regard to teacher expectations and demands upon students. Do our programs really challenge students of all ability levels to exceed their own expectations?

4. Equity of our programs in the public schools. Can we any longer justify the traditional pattern of predominately white, male, and rural students?

5. The role of secondary agricultural education in general education and college preparatory education.

I believe these are significant and important areas for research in agricultural education, and I'm sure each of you can develop your own lists. The point of mentioning them is that research in agricultural education should be an instrument for change, rather than a tool to justify what is, in most cases.

Another set of thoughts struck me as I read Bob's second category of requisites for further progress relating to personnel and institutional requisites. The summary of research he provided on research performance of faculty members, and the environment and conditions surrounding their work, was interesting. Beyond research funds, time assigned for research, contact with colleagues, reinforcement, institutional attitude, and related factors -- as far as agricultural education faculties go, size of department appears to be a factor. For example, Kirby Barrick's 1986 Annual Report of the Editor of the AATEA Journal shows that 42 percent of the articles submitted by states came from the Central Region, and primarily from Land Grant institutions with larger numbers of agricultural education faculty members.

In addition to examining factors which facilitate research, we perhaps need to have a better grasp of barriers to doing research. Inquiry into the prevalence and consequences of role conflicts among agricultural education faculty may be fruitful. I suspect that role conflicts may be less severe where an adequate critical mass of faculty members is available to "divide up the chores" in running comprehensive programs of teacher education and graduate education. Critical mass (i.e., "adequate" numbers of faculty within a department) may be as important a requisite as an individual faculty member's research interests and motivations when research performance is examined.

I will now comment briefly on two of Bob's requisites to further progress of research in our field, namely a) time to plan and conduct research, and b) additional dollars to support research.

Regarding time to plan and conduct reseach, I was interested in Bob's remark that few faculties in colleges of agriculture would tolerate the arrangements for research routinely experienced by agricultural education faculty. Is anyone doing research on faculty load among members of various departments in colleges of agriculture and education to see how we compare with our academic colleagues? Are we similar or dissimilar with respect to contact hours in teaching, extramural teaching, numbers of undergraduate and graduate advisees, and commitments to off-campus service activities? If anyone has the information, how is it being used? If we don't fit the pattern very well, could we affect policy and resource allocation decisions to expand staffing, making the time required for planning and conducting research more realistic?

Regarding additional funds needed to support research in agricultural education, Bob urges our "fair share" of experiment station dollars. I agree with his thinking on this point, but those of us in colleges of education usually are not eligible for these funds, except by "back door" means. I think we should also raise questions about state department of education (SDE) research funding policies. SDEs in many of our states do not favor service-area-specific research. Far too much of federal and state funds go to "general votec" research -- without clearly identified target groups to implement its findings. Maybe we would be more successful at getting our "fair share" of these resources if we proposed more research in the "significant and important" category, perhaps directed at renewing our field.

Bob, thank you for your stimulating, positive, and constructive paper. I give it an A (pause) minus.

Reactions of
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to a "Keynote Address" of
J. Robert Warmbrod, Professor
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The Ohio State University
at the
41st Annual Central States Research Conference
Chicago, Illinois
1987

"Research In Agricultural Education: Requisites For Further Progress"

In a simple sentence, Dr. Warmbrod has presented an excellent paper that merits reading, study and implementation by professionals in the field of agricultural education. Professor Warmbrod carefully and accurately outlined the current status and issues of research in agricultural education and provided a number of essentials or requirements if research in agricultural education is to make progress in the future. He clearly delineated the progress over the past twenty years and portrayed the value and expectations for research in the future. He indicated that research has come-of-age in the field of agricultural education. He also suggested that research is no longer an either/or issue for faculty at major universities. There is no choice as to whether a professor of any rank will be involved in research or will simply engage in teaching and service. Professor Warmbrods' comparison of the expectations of assistant professors of today with 20 years ago with today is an accurate and realistic illustration of the situation.

Warmbrod begins the paper by briefly reviewing progress over the past 10 to 15 years. Obviously, considerable competence has been developed in the field. The amount and quality of research expected of assistant professors is clearly amplified. The status of research today as a measure of professional competence

is far above other aspects of the land-grant mission. A professor of vocational education recently stated at a promotion and tenure staff meeting at our institution that "I expect all staff members to have two refereed journal articles every year. I will not vote for promotion if they have not met that requirement." Though many may disagree with that statement, the mentality, attitudes, expectations and the demands are clearly evident. To research or not to research is no longer an option available to professors in institutions who seek to be on the cutting edge. Faculty are establishing and endorsing these standards. They do not come solely from university administrators.

Warmbrod pointed out the opportunities to publish in refereed journals. However, he did not address the issue of the reputation of those journals. One wonders who is reading or reviewing our journals. Are they being reviewed and examined and quoted by researchers and practitioners of the day? Our research may not be at the center of the critical issues in education today. Warmbrod is correct. We may not be identifying the real problems and questions.

He did not address the issue of whether or not our research really has an impact on practice. Do those of us who teach, read the studies and glean from them findings that should be placed into practice? Are we conducting research that <u>really</u> influences practice and the field? I am convinced we have research that has not been acceptable for our refereed journals and conferences. However, this research has greatly influenced practice. The frustration comes when reviewers have judged it to lack important research parameters. Is the mentality today only experimental and descriptive design, internal and external validity, validity and reliability of instruments, nonresponse and appropriateness of statistical analysis? Is there room for bona fide case study

research? Is there room for well designed literature review research? Is there room for historical research? I submit the answer ought to be yes but the facts seem to reveal a "no way." However, we could be falling into a trap of endorsing only experimental and descriptive designs. These studies seem to be the only ones that warrant making the grade for being refereed at conferences or in print. I believe we are also guilty of continually researching and reporting the same issues.

Warmbrod merits a real compliment when he proposed the need to synthesize areas of study in the field. Is there room for research similar to Rosenshine and Furst or Dunkin and Biddle's efforts on effective teaching? Would investigators have any credibility if they were to concentrate effort on studying studies of others? Would we still recognize them as researchers if they lacked the use of surveys, statistical treatment and the data analyses we seem to value so highly.

Think for a moment as to the generalizations and principles that have been gleaned from studies in supervised occupational experience and teaching methods? In fact, we have espoused the idea for decades that we teach around problem-solving. However, I submit our research in the area is sparse. In the field of problem solving research, is anyone in agricultural education a recognized national authority? It is possible that our concept of problem-solving and our practices are not identified with research generalizations from any source. Consequently, we research because it is expected. In general, we do not develop a plan and make a commitment to become "expertise" in an area of study. We may be simply going through the motions. It is time to reflect on why we research. Warmbrod deserves high marks when he suggested that researchers must become

expert and scholarly in an area and become conversant with all the literature in that area. For example, we must not step into problem solving research until we learn of the vastness of the field and begin to understand that hundreds of articles are being added to the literature each year. Researchers of all levels do more than simply review the agricultural education literature. We must be conversant with important related literature. Warmbrod is right when he suggested we cannot become scholarly when unrelated topics are pursued each year. We need to make associations with nationally known researchers on our campuses. We can benefit from their kbowledge, reputation and connections to funds.

Wambrod is to be commended for suggesting time be set aside for research and monies be provided faculty. Continuity could become a reality if one did not have to write proposals on varying topics to maintain support. Possibly agricultural education staff members need to be organized as research teams. Those who research should be protected from excessive teaching and service responsibilities. However, all members of the staff must draw from the results and assist with the investigations. Institutions and faculties need to be identified with one or two themes of research that examine significant questions rather than practice duplicated trivia at each university. All could draw from the scholarly and expert development. Regionally and nationally, the profession could benefit from a level of scholarly competence at a number of major universities. Possibly we could gain more respect from our colleagues in agriculture and education.

Finally, it seems the only point Warmbrod did not address was the fact that research in agricultural education may have "grown-up" among those assembled

here. However, teachers and leaders of vocational agriculture have little if any appreciation for research. Research is generally brushed aside as being of no real value to practitioners. One only needs to listen to our teachers for a few minutes to find a lack of appreciation for research. Unfortunately, research may not have made much real progress during the past decades in terms of its value to practitioners. It is evident that the new movements in teacher education (i.e. postbaccalaureate programs) are not based on a body of research evidence. Rather, hunches or untested ideas seem to be the basis for change. College deans and faculties are equally guilty of endorsing research and making changes based on ideas and hunches. Consequently, we cannot be too critical because we may not be doing so well ourselves. Principles of teaching amd learning ought to have their roots in research. However, it may be that we have wandered so far from our roots in teaching that we have not connected reasons for practices as being associated and the results of research investigations. I submit it is time to teach research appreciation. Teachers must be sensitive to the fact that pedagogy is research based.

For what will it profit us if we gain great research respectability and have it ignored in practice.

REACTION TO J. ROBERT WARMBROD'S PAPER ENTITLED "RESEARCH IN AGRICULTURAL EDUCATION: REQUISITES FOR FUTHER PROGRESS"

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I want to commend Dr. Warmbrod on preparing and presenting a timely paper. I agree with the message in the paper and I will use my time to emphasize and expand on a few of his points.

I enjoyed hearing Dr. Warmbrod describe the indicators of progress in agricultural education research in the past 10-15 years. I have experienced many of the "growing pains" that have made research a more visible and viable part of the agricultural education profession.

Webster defines a profession as a vocation requiring a body of knowledge. A profession must have means for verifying existing knowledge and discovering new knowledge. This means that research must be an ingredient of all professions, including the agricultural education profession. Universities are organized on the basis of knowledge. If agricultural education is to be a recognized discipline in the university structure, it must have a research base. It will be difficult for teaching and service units in major universities to survive in the future without a viable research component. Research is needed to provide a knowledge base for teaching and service and to:

1. verify existing knowledge,
2. solve problems,
3. discover new knowledge,
4. provide direction for the future,
5. identify and compare progress, and
6. determine methods of applying knowledge at local, state, national and international levels.

Dr. Warmbrod commended the agricultural education profession for progress in the methodological dimension of research and challenged it to pay more attention to the problems and issues researched. I want to emphasize this point by using an example from teaching. We all know that the first step in developing a teaching plan is to assess the situation (determine needs of students, industry and the community), then, we determine what subject matter to teach. After that, we start considering which teaching method would maximize learning. A student teacher may be in trouble if he/she said to his/her university supervisor, "I'll be using the computer in this class today, now all I need to do is

select the agricultural skills to be taught." Sometimes we let the "how" overshadow the "what" in our teaching, and in our research.

Dr. Warmbrod challenged us to focus our research on the vital core of agricultural education (teaching, learning, etc.). I agree, but would like to take this concept one step further to emphasize that the teaching and learning we are researching should be in agriculture. We must not forget about the research priorities of the larger university unit of which agricultural education is a part.

For example, the research priorities of the College of Agriculture and the Agricultural Experiment Station of which agricultural education at Iowa State University is a part are:

1. To improve the protection of Iowa's natural resources, including its soil, water, environment and wildlife.
2. To improve resource use in the production of Iowa's crops and animals with emphasis on productivity and potential diversification.
3. To improve decision making in the production and marketing of Iowa's agricultural commodities and the management of farms and other agribusinesses.
4. To improve the potential for value-added processing of Iowa commodities for domestic and international markets.
5. To improve evaluation of public policy alternatives and their impact on Iowa.
6. To improve the ability of Iowa communities and organizations to provide social and human services and enhance the quality of life in Iowa.

Agricultural education is expected to contribute to the accomplishment of these research priorities. Our research could focus on teaching or learning in one of these areas, adding to the vital core of agricultural education's knowledge and at the same time making a contribution to the research priorities of the college.

As we consider the research priorities of other units, we need to look for opportunities for interdisciplinary research. Does agricultural education have research interest and expertise that could be used in one of the research priorities listed above? I belive we do, but we must be more active in communicating with our colleagues in agronomy, animal science, agricultural economics and other areas. Agricultural education must become more active in planning research initiatives for the larger university units of which we are a part.

Let me give you an example of the need for agricultural education research to become more visible in the eyes of other disciplines. Recently the North Central States Association of Experiment Station Directors appointed a

committee to develop "Social Science Research Priorities". The committee included people from agricultural economics, home economics and rural sociology. Agricultural education was not represented on the committee. Agricultural education is widely known for high-quality teaching, advising and service. We need to develop the same reputation for agricultural education research. I believe agricultural education has taken one giant step in this regard by seeking and receiving approval to establish an agricultural education research committee within the north central states experiment station structure. (The functions of this committee will be described more completely at the seminar following this meeting.)

I was pleased that Dr. Warmbrod challenged us to use theory and related research in a more scholarly way. The "review of literature" or "theoretical construction" is frequently the weakest element in agricultural education research. With the availability of computerized literature searches and other research tools, such weakness should not exist. Researchers must be familiar with the literature and the theory related to their investigations. Researchers should become authorities on the problems and issues they investigate.

I join with Dr. Warmbrod in calling for a greater committment to research in agricultural education. We must look for ways to secure new and/or reallocate existing resources to research. Agricultural education must continue to strive for excellence in research.

MARKETING AGRICULTURAL EDUCATION

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Introduction

Marketing agricultural programs is vital to land grant colleges. Fewer students are selecting agricultural programs, and as a result financial resources needed to sustain these educational programs are declining. Agricultural education departments within these land grant colleges are specifically interested in attracting more students. To effectively market the agricultural education major it is necessary to develop a better understanding of what is appealing to prospective students. It is also important to find out more about the current image of the major and the college offering it.

Market researchers are using a state of the art technique, focus group interviewing, to obtain clients' perceptions of products and services. People, purposefully selected, meet in small groups to discuss the products or services being studied. The interviewer or moderator raises various issues, focusing the discussion on topics of interest to the researcher.

Although focus group interviewing has been used by market research firms since the 1950's it has recently become one of the most common techniques used to determine consumer attitudes and opinions about products or services (Cox, Higginbotham, and Burton, 1976). Quaker State Oil has used focus groups to develop new packaging for its motor oil (Quaker State expects...). Exxon based a new advertising campaign on information obtained through focus groups. Overcoming fear of office information systems became their key advertising strategy (Lacy, 1984). RCA and General Electric have used focus groups to develop corporate image campaigns. Market researchers used focus groups to gather information from target audiences on perceptions of the companies and their competitors. To determine how to reposition the companies, concepts were tested with focus groups (Bertrand, 1986).

This technique is now being used to a greater extent by the public sector to gauge appeal of ideas, products, and services. The health care industry has used focus groups to design smoking prevention programs (Heimann-Ratain, et al.,1985) and to increase the use of family planning

(Folch-Lyon, et al., 1981). Syracuse University held over two dozen focus groups with alumni to evaluate plans for a fund drive (Bennet, 1986). Focus groups have been used at California State Polytechnic University in Pomona to obtain a better understanding of why some students avoid participation in class (Berdine, 1986). The Minnesota Extension Service has used focus groups to obtain reactions to proposed educational designs for seminars (Mueller and Anderson, 1985), and to obtain peoples' perceptions of informal education and of county extension offices (Minnesota Extension Service, 1985).

The Agricultural Education Division of the University of Minnesota used this same market research technique to obtain information from prospective students. These students represent potential clients and hold certain perceptions about our product, an Agricultural Education degree from the University of Minnesota. These perceptions greatly influence the students' decision of where to attend college and the course of instruction to pursue. Colleges and other agricultural education providers that stay in touch with their clientele may be better able to adapt marketing strategies, curriculum, and services and thereby increase the number of students attracted.

Purpose and Objectives

The purpose of this research effort was to obtain information to assist in marketing the Agricultural Education major at the University of Minnesota. Specific objectives of the study were:

1. To identify factors which influence students' decisions about the type and location of educational institution to attend beyond high school.
2. To describe student perceptions of the University of Minnesota.
3. To describe students' perceptions of career opportunities available to agricultural education graduates.

Procedures for Focus Groups

Four characteristics of focus groups distinguish this research technique from other types of interview based inquiry: careful recruitment of participants, proper meeting environment, skillful moderator, and appropriate analysis and reporting (Krueger, 1986).

Careful recruitment of participants is necessary for effective focus groups. Each group should consist of 7 to 10 people with similar backgrounds, but who are not familiar with one another. This size group is small enough to be manageable but large enough to offer a range of insights by participants. Participants are usually more willing to discuss their opinions openly if they are unfamiliar with the other members of the group but know they have all been selected for participation because they are similar in some way, such as all being farmers or all being FFA members. Three to four sessions should be conducted.

A proper meeting environment helps set the stage for the successful sessions. A neutral meeting place is preferred. Participants should be seated in a circle to maximize the possibility of eye contact and promote discussion. Each session should be tape recorded for later analysis.

Moderators and assistant moderators should be trained to conduct

focus groups to create an atmosphere which promotes permissiveness and sharing. Moderators must possess the ability to listen carefully and question when necessary. They should follow predetermined questions but know when to pause to prompt additional comments and when to probe to obtain additional information.

Analysis of the data collected should be systematic and verifiable. Care must be taken to obtain these characteristics or to recognize the potential limitations which have affected the process and results.

Study Procedures

A procedure for conducting focus group studies outlined in Focus Group Interviewing (Krueger, 1985) was used to conduct this study. This nine-step procedure consists of three phases, the planning phase, the preparation phase and the execution phase. In the planning stage the purpose of the study and the users of the information were considered to determine the type of information needed. A tentative plan was developed in this phase and an estimate of resources needed to complete the study was prepared. The preparation phase consisted of identifying the questions to be asked, learning moderator skills, and selecting group participants. In the execution phase the group interviews were conducted, data were analyzed, and result reports were prepared.

FFA members in their junior year of high school from small rural schools attending the Minnesota State FFA Convention were the target population for the study. The study sought to determine the perceptions of this group for a number of reasons. FFA is a logical organization from which to recruit students, and it was assumed that FFA members attending the state convention were more likely to be prospective college students. Consequently, the researchers were particularly interested in perceptions and opinions of this group. Juniors were selected because it was felt that these students were at the age to be considering further education but probably would not have made specific plans to attend a particular institution.

Selected FFA advisors of small rural schools were asked to send one junior FFA member to a scheduled session. A 50% response rate was expected. Three sessions with an average of eight participants were conducted. Each session was conducted by a trained moderator, and in two sessions assistant moderators were present. Each session lasted about an hour and was audio taped.

Questions used in the interviews were developed and reviewed by faculty members of the Division of Agricultural Education. A pilot session was conducted with 8 members of the Ag Ed Club.

Each group was asked the same "core" list of questions (Appendix A). General questions about organizations were used to begin the sessions, allowing each student a chance to talk and adjust to the group. The questions were designed to become more specific as the session progressed. Additional questions were asked as necessary to expand on an issue or probe into an area being discussed. A brief form was completed by participants during each session to encourage individual thought about attitudes toward occupations related to agricultural education before discussion.

Immediately after each session moderators and assistant moderators

noted common opinions and perceptions expressed by participants during the interview. Moderators and assistant moderators later met to discuss the interviews. Tapes were summarized and evaluated to detect reoccurring themes in the three sessions. A draft report of the analysis was prepared for review by members of the moderator team to check validity.

Results

Reasons for selecting an institution

Students considered cost, size, and location the most important factors to consider when selecting a school. They also considered reputation of the school, recommendations of people, familiarity with the school, and how well they felt they would fit in.

Many students considering a four year degree said they would go to a less expensive school (community college or state college) to take electives and then transfer to a more expensive school as juniors. Students generally did not consider the amount of financial aid or part-time work available from an institution when estimating costs. Size of the institution was important. Small schools were generally deemed more desirable than were larger institutions. Location was also a factor in their decisions. Institutions located close to home were more attractive to these students than were institutions of greater distance from their home communities. Student comments included:

> When you go to visit a college if the students are friendly, you kind of feel like you fit in. That helps a lot. If they look like you.

> I'm a junior this year but I'm going to college next year. I wanted to go to Crookston because it has a good reputation, and it's a good ag school. Since it is a small school you can get a lot of individual help and I really like that.

Perceptions of the University of Minnesota

Students saw the University of Minnesota as "too big", "too scary", and "too impersonal". Its' size, location, and perceived lack of humanistic qualities were deterrents to student enrollment. Students were concerned about the lack of personal attention available and lack of opportunity for personal interaction. Students felt they would not have an opportunity to receive the help they would like at such a large institution. Rather than interpreting the large student body in a metropolitan area as an opportunity to meet more people, it was viewed as an obstacle to personal interaction. The reputation of huge class sizes and the huge student population led students to believe that they would have difficulties in getting to know other people. Students were also concerned that they may not "fit in" in a cosmopolitan setting. Students who had visited the campus before or had known someone who had attended the University were less apprehensive about the setting. Student comments included:

I was looking at here and St. Cloud and I decided I'd go there for the first two years at least and then maybe I'd come here after I've gotten started. You know, the size of the classes, freshmen and sophomore years, its really scary.

Its a big city and I wouldn't want to live in a big city.

It seems a bit big. I know some people like that but I like to know a lot of people so if I say Hi to someone I know who I'm saying Hi to.

Bigger classes with more kids, you wouldn't get to know a lot of people like you would at smaller schools.

Perceptions of career opportunities available to Ag Ed graduates

The majority of these high school students were unaware of what a major in agricultural education was or what occupations a graduate in agricultural education would be qualified for. Those students who were aware of the major had a limited perception of the number of occupations available to ag ed graduates.

Conclusions and Recommendations

Students perceived the University of Minnesota as a large, impersonal institution and were concerned about their ability to succeed. Students wanted to attend an institution where teachers would be concerned about them. While these results may seem to be intuitively appealing, they were at odds with established procedures for recruiting students. Over the years the University has portrayed itself as an institution with "4 million volumes in its library system", "great size", "44,000 students", and "250 undergraduate majors offered by 18 different colleges". (Prospective Student Brochure - 1985-86)

With results from this study in mind the Agricultural Education faculty reexamined its recruitment and marketing process, and made modifications. A revised recruitment plan was initiated which was specifically designed to alleviate anxieties of potential students. Letters sent to prospective students emphasized the smallness of the St. Paul campus "about 3000 students", "friendly students", "a broad array of employment prospects", and "professors who really care". Recruitment techniques incorporating personal contact of prospective agricultural education students by either faculty or a faculty representative were seen as a positive way of overcoming some of the concern about lack of caring about the student at the University. The number of recruitment visits made to students was increased, and extra care was taken with students visiting campus to make them feel welcome.

This study reinforces the concept that students are consumers of higher education. Students are not blindly selecting institutions and programs by accident but rather after careful reflection. Even at the junior year of high school students exhibit specific preferences in their

future educational goals. Agricultural education departments must remain in touch with these potential consumers and promote their programs in ways that attract and interest students.

Universities concerned about marketing their programs should consider using focus groups as a method of determining prospective students' current perceptions of their institutions and programs. Information obtained through focus groups can aid in decision making about how to better promote these institutions and their programs.

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Appendix A

Focus Groups - Marketing Agricultural Education
Outline of Questions

At the beginning of the session students were asked to introduce themselves and name the youth organizations in which they participate.

1. As we went around the room I heard you mention several different youth organizations. In general, what influenced you to participate in these groups?

2. All of you are members of FFA. What specifically influenced you to participate in FFA?

3. Let's talk about educational opportunities after high school. A number of people anticipate training or education after high school. This education might be from an area vocational technical institute, a community college, a private college, a state university or the University of Minnesota. The decision of where to go for more education can be influenced by a number of factors. What are the things that influence your choice?

4. Some of you may be considering the University of Minnesota. What are the things about the University that impress you, specifically the things that might cause you to enroll at the University?

5. What are the things what would cause you to stay away from the University of Minnesota?

6. Some career areas are listed containing a number of different careers. In each cluster put an M beside the career that strikes you as the most interesting and an L beside the career that seems least interesting or appealing. Circle the cluster of jobs that seem most interesting to you.

7. With-in the University or college there are a number of departments. For example: chemical engineering, physics, history, and agronomy are just a few of the many departments. Another department is agricultural education. When you hear "agricultural education" what comes to mind?

ATTITUDES OF NEBRASKA SUPERINTENDENTS, PRINCIPALS AND VOCATIONAL AGRICULTURE INSTRUCTORS ABOUT THE DELIVERY OF ADULT EDUCATION THROUGH SECONDARY VOCATIONAL AGRICULTURE PROGRAMS

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INTRODUCTION

Vocational Agriculture programs across the nation have been loosing enrollment and facing possible program reduction and elimination for several years. A steady decline in public school enrollments has been well documented across the United States. From 1972 to the present there has been a decrease of about 21% or 68,000 students in K-12 public school system in Nebraska. Vocational agricultural programs across the state have lost 21 percent in secondary enrollment just since 1981.

Compounding the enrollment problem has been the movement of families away from the rural areas because of the sluggish agricultural economy. School budgets are being strained and administrators are hard pressed to find answer for their financial problems. Tax payers are beginning to question the value of public support for education in which they are becoming more and more removed.

While some secondary school administrators are beginning to see the adult population as another cliental group that can be served, other administrators continue to view their school systems only for students in grades 9 through 12. Now may be the most important time for administrators and secondary vocational agriculture instructors to investigate the possibilities of adult education within public secondary vocational agriculture programs as a means of safeguarding vocational agriculture enrollment and fully utilizing school facilities in a time of reduced financial resources.

Rapid changes in agricultural technology, coupled with an increasingly older agricultural population, make adult education in agriculture a must (White, 1984). In order to facilitate the process of incorporating adult vocational agricultural education into traditional secondary programs, individuals most directly involved in organizing, funding, and conducting adult programs need to be encouraged to do so.

Viterna (1973) concluded that administrators were directly responsible for program development. He also found that these same administrators were willing to support young farmer classes in Nebraska. Miller (1985) indicated that superintendents of comprehensive high schools in Ohio were conceptually supportive of adult vocational agricultural education, when studying the attitudes of superintendents toward offering adult education in agriculture in secondary vocational agriculture programs. Miller recommended that similar studies be conducted in other states.

A natural for this type of program in stressful economic times are the adult financial management and recordkeeping programs. Post (1985) found that those individuals enrolled in Young Farmer/Rancher Programs in Nebraska generally lacked the competencies necessary to be effective in financial matters.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the attitudes held by Nebraska superintendents, principals and vocational agriculture instructors about the delivery of adult agricultural education programs within the public secondary school system.

The specific objectives identified for investigation within this study were:

1. Determine if differences in attitudes exist between superintendents, principals, and vocational agriculture instructors toward adult agricultural education.
2. Determine if differences in attitudes exist between administrators (superintendents and principals) and vocational agricultural instructors toward adult agricultural education.
3. Determine attitudes of superintendents, principals and vocational agricultural instructors about the delivery of adult agricultural education through secondary schools.
4. Determine relationships between attitudes of superintendents, principals and vocational agricultural instructors when compared by self-rating of their current attitude toward delivery of adult education through secondary vocational agriculture programs.
5. Determine if differences in attitudes exists between administrators and vocational agricultural instructors by the existence of a current adult program.
6. Determine if differences in attitudes exists between administrators and vocational agricultural instructors when compared by years of experience as an administrator or vocational agriculture instructor.

PROCEDURES

This was a descriptive study of the survey type. A list of current Nebraska secondary schools with vocational agriculture programs was obtained from the University of Nebraska Department of Agricultural Education. From this list a random sample (43%) of the schools were selected for inclusion in the study. Fifty-seven individual superintendents, principals and vocational agriculture instructors (total N = 171) were included in the sample.

The questionnaire was developed from a review of literature and from suggestions of staff members at UNL. A jury of teacher educators from the UNL Department of Agricultural Education established content validity for the instrument. Reliability was determined to be .7812 for the entire instrument using Cronbach's Alpha.

The surveys were mailed to each individual separately. The mailing contained a cover letter explaining the perceived need for the study, along with a self-addressed return envelope and the questionnaire. A follow-up letter of reminder was mailed two weeks later. A follow-up phone call was made to those individuals that had not responded after the first two contacts. No difference were observed between the nonrespondent group and those completing the survey initially. This procedure produced a overall response rate of 92.4% for all respondent groups (158 of 171).

Each questionnaire contained 30 specific attitudinal items as well as selected demographic data. Respondents were asked to respond to each item using a four point, bipolar scale with 1 = Strongly Disagree, 2 = Disagree, 3 = Agree, and 4 = Strongly Agree.

Analysis of each item as well as categorical data was accomplished using inferential statistical procedures. In order to control for the effects of an inflated alpha, the survey items were further grouped into four areas of Need for the adult program, Benefit of the adult program, Operation of the adult program,

and Funding of the adult program. This grouping facilitated a better understanding of attitudes of a categorical nature and assist in the analysis of the data.

Data analysis procedures consisted of calculating means and standard deviation, and determining statistical differences through the use of t-test and oneway analysis of variance using planned comparisons. Pearson Product Moment Correlation Coefficients were calculated to determine the relationship for selected variables. Multivariate analysis of variances was used to determine possible interaction affects.

RESULTS

Upon analysis of the data the following results was obtained. The results were organized according to the objectives of the study.

Objective 1: Determine if differences in attitudes exists between superintendents, principals, and vocational agriculture instructors toward adult agricultural education.

Data in Table 1 reflects the agreement of superintendents, principals and vocational agriculture instructors with attitudinal statements about adult education in agriculture. The table is organized into the four categories of need, benefits, operation and funding.

No significant difference in attitudes was observed in the four broad categories of need, benefits, operation and funding. However, several specific statement differences were observed between teachers and principals and teachers and superintendents. Their were no differences in agreement on statements at all between administrative groups.

Vocational agriculture instructors has significantly higher agreement ratings than from both administrative groups on the following statements:

--Those who participate in adult programs are strong school supporters.

--A high school's primary responsibilities are to students in grades 9-12.

--The free public education system extends to adult students.

--Local tax dollars should be used to support adult education.

Vocational agriculture instructors has significantly lower agreement ratings than from both administrative groups on the following statements:

--Adult programs are the responsibility of the postsecondary schools, not the high school.

--All consumable supplies used by adults should be paid for by adult students.

--Adult programs need to be self-supporting.

Vocational agriculture instructors has significantly higher agreement ratings than principals on the following statements:

--Adult programs should be conducted with the aid of an advisory council.

--Use of school facilities during hours school is in session is acceptable.

--Use of school facilities during nonregular school hours is acceptable.

--Nebraska State Department of Education supports adult education as part of secondary vo ag programs.

Vocational agriculture instructors had a significantly lower agreement rating than principals on the following statement:

--Adult programs are the responsibility of the community colleges.

Vocational agriculture instructors has significantly higher agreement rating than superintendents on the following statement:

--Adult education has a visible impact on local agricultural practices.

Table 1.
Attitudes of Principals, Superintendents and Vocational Agriculture Instructors Toward Adult Education

Item		Respondent Group Principal	Superin't	Vo Ag	Total
NEED					
Agriculture is of little importance within our school district	M	3.6	3.4	3.7	3.6
	SD	.64	.95	.73	.80
Adult Education programs should be available to everyone in the district.	M	3.2	3.2	3.9	3.3
	SD	.58	.65	.67	.63
Adult programs need to be geared toward retraining for new employment.	M	2.5	2.5	2.4	2.5
	SD	.61	.78	.66	.69
Adult programs should include new technological skills needed for employment	M	3.1	3.1	3.1	3.1
	SD	.53	.45	.46	.48
Composite for Need	M	3.1	3.1	3.1	3.1
	SD	.35	.42	.36	.37
Benefits					
Adults in our district want more information when dealing with agriculturally related subjects	M	3.1	3.1	3.1	3.1
	SD	.58	.44	.56	.53
Adult programs in agriculture should serve the nonagricultural public	M	2.7	2.8	2.7	2.7
	SD	.58	.78	.70	.68
Having adult progams in the school improves the community attitude toward the school	M	3.5	3.3	3.4	3.4
	SD	.54	.58	.64	.59
Adult programs have a visible impact on local agricultural practices	M	2.8	2.7	3.1	2.9**b
	SD	.60	.61	.58	.61
Those who participate in adult programs are strong school supporters	M	2.9	2.8	3.2	3.0**c
	SD	.50	.69	.58	.61
Adult programs are good for public relations with the community	M	3.4	3.2	3.4	3.3
	SD	.49	.47	.53	.50

Table 1 Continued

The addition of an adult education program in agriculture detracts from the secondary program	M SD	1.7 .71	1.8 .56	1.8 .72	1.8 .68
Composite for Benefits	M SD	3.1 .29	3.0 .40	3.2 .35	3.1 .35
OPERATION					
A high school's primary responsibility is to students in grades 9-12	M SD	1.7 .67	1.5 .67	2.1 .84	1.7**c .77
Adult programs are the responsibility of the Post secondary vo-tech schools	M SD	2.5 .67	2.6 .72	2.0 .52	2.4**c .68
Adult programs in agriculture should serve the non-agricultural public	M SD	2.7 .58	2.8 .78	2.7 .70	2.7 .68
Adult programs should be offered by all high schools that offer vocational agriculture	M SD	2.6 .68	2.5 .76	2.8 .70	2.7 .72
Comprehensive high schools have a responsibility to offer adult programs when the need for the program is present	M SD	3.0 .76	2.9 .77	3.2 .64	3.0 .73
Adult education is the responsibility of the Cooperative Extension Service	M SD	2.5 .69	2.7 .65	2.6 .70	2.6 .68
Adult programs are the responsibility of the community colleges	M SD	2.8 .64	2.7 .63	2.5 .58	2.7*a .63
Adults programs should be with the assistance of a vocational agriculture advisory committee.	M SD	3.0 .56	3.0 .49	3.2 .62	3.1*a .57
Use of school facilities during hours when school is in session is acceptable	M SD	2.2 .83	2.4 .84	2.7 .75	2.4**a .83
The UNL Department of Agricultural Education staff supports adult programs as part of secondary programs	M SD	3.0 .63	3.0 .34	3.1 .52	3.0 .51
Use of school facilities during nonregular school hours is acceptable	M SD	3.3 .45	3.4 .50	3.5 .50	3.4*a .49

Table 1 Continued

Current vo ag instructors do not want to teach adult programs	M	3.0	3.1	2.9	3.0
	SD	.49	.66	.75	.64
Adult programs should be conducted by someone other than the vo ag instructor	M	2.7	2.8	2.9	2.8
	SD	.67	.73	.74	.71
Vo ag instructors do not have the time to teach adult programs	M	2.4	2.2	2.5	2.3
	SD	.65	.72	.80	.73
Adult programs should be intensive, in-depth educational programs in order to be useful	M	2.4	2.6	2.6	2.5
	SD	.70	.85	.70	.75
Composite for Operation	M	3.1	3.1	3.2	3.1
	SD	.19	.24	.21	.22
FUNDING					
Nebraska State Department of Ed supports adult education as part of secondary vo ag programs	M	2.7	2.9	3.1	2.9**a
	SD	.54	.45	.50	.51
All consumable supplies used in adult programs should be paid by participants	M	3.2	3.3	2.6	3.1**c
	SD	.59	.62	.69	.70
State and national funding is adequate for adult programs	M	2.0	1.8	1.9	1.9
	SD	.72	.81	.90	.82
The free public education system extends to adult education as well	M	2.2	1.9	2.7	2.2**c
	SD	.85	.74	.76	.84
Adult programs need to be self-supporting	M	3.0	3.1	2.3	2.8**c
	SD	.75	.73	.63	.79
Local tax dollars should be used for adult education	M	1.8	1.7	2.7	2.2**c
	SD	.72	.75	.65	.65
Funding of programs is not a current issue in adult education	M	1.7	1.6	1.9	1.7
	SD	.85	.80	.81	.82
Composite for Funding	M	2.6	2.6	2.6	2.6
	SD	.23	.19	.21	.21

Note: M = Mean SD = Standard Deviation
* = $p < .05$ ** = $p < .01$
a = Vo Ag Teachers differ from Principals
b = Vo Ag Teachers differ from Superintendents
c = Teachers differ from both Principals and Superintendents

Objective 2: Determine if differences in attitudes exists between Administrators (superintendents and principals combined) and vocational agricultural instructors toward adult agricultural education.

Attitudinal scores of principals and superintendents were combined to reflect one administrative rating and compared with attitudinal ratings of the instructor group. A statistical difference in the area of Operation ($p < .026$) was observed. However when the actual means were reviewed, the difference was not meaningful. All other areas of comparison between administrators and vocational agricultural instructors were not significant.

Objective 3: Determine attitudes of superintendents, principals and vocational agricultural instructors about the delivery of adult agricultural education through secondary schools.

Figure 1 illustrates the percentage of respondents selecting specific agencies and/or organizations as being most responsible for delivery of adult education at the local level. It was observed that 34 percent of those surveyed indicated secondary school systems as being their first choice for delivery of adult agricultural education. The agency selected as second most responsible for delivery of adult agricultural education was the cooperative extension service (22%).

Objective 4: Determine relationships between attitudes of superintendents, principals and vocational agricultural instructors when compared by self-rating of their attitude toward delivery of adult education through secondary vocational agriculture programs.

Respondents were asked to self-rate their attitude toward the delivery of adult education programs through secondary vocational agriculture in one of the following ways:

Negative- not appropriate for secondary school delivery;
Somewhat negative- I need more evidence of the potential;
Somewhat positive- adult programs could be part of vo ag;
Positive- adult programs should definitely be part of vo ag.

These ratings were correlated with attitudinal areas by respondent group (Table 2). It was observed that superintendents attitude was positively correlated with their perceptions about the benefits of adult programs ($r = .54$, $p < .0001$).

Table 2
Pearson Correlation Coefficients (r) by Respondent Groups for Attitude Rating by Category

Respondent Group	Attitude Rating x Category			
	Operation	Benefits	Need	Funding
Principals	.16	.47**	.15	.13
Superintendents	.42**	.54***	.23	-.32*
Vo Ag Instructors	.14	.41**	-.04	.13

Note: * significant at $p < .05$, ** significant at $p < .01$
*** significant at $p < .0001$

Objective five and six look at interactions that may exist between two demographic variables, respondent group and the attitudinal areas of need, benefits, operation, and funding. In order to control for inflation of the family wide alpha error rate the two variables believed to have the potential for the most interaction were selected.

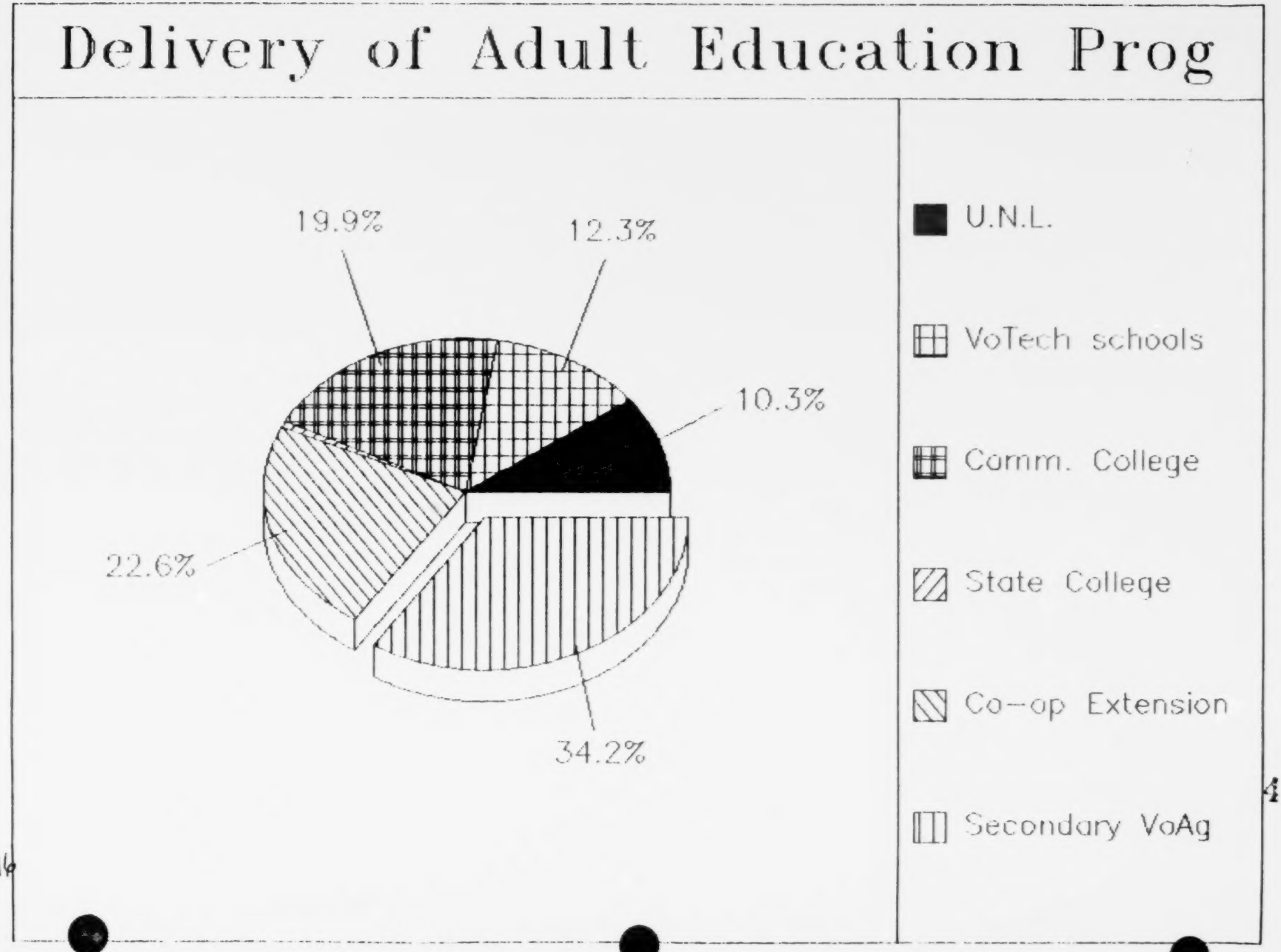
Delivery of Adult Education Prog
19.9%
12.3%
10.3%
22.6%
34.2%
U.N.L.
VoTech schools
Comm. College
State College
Co-op Extension
Secondary VoAg

Figure 1

Objective 5: Determine if differences in attitudes exists between administrators and vocational agricultural instructors by the existence of a current adult program.

The MANOVA procedure was used to determine if there were interaction between the existence of adult programs and respondent group by the four attitudinal areas. A significant interaction was observed between the current existence of an adult program and respondent group by operation of the adult program (Table 3). Those vocational instructors who have adult programs viewed the operation of the adult programs differently than those instructors who did not have a adult program. They also viewed the operation differently then both superintendents and principals who may or may not have adult programs within their school.

The attitude of respondents by position toward the benefits of an adult programs and the fact they may have existing adult program show no significant interaction. There was however a significant main effect ($p < .001$) indicating those schools that had existing adult programs had a higher mean (3.19) than those schools that did not have an adult program (2.99).

Table 3.

Differences among Respondent Group with Adult Programs by Operation.

Source of Variation	S.S.	D.F.	M.S.	F ratio	Prob.
Position	.259	2	.129	3.20	.045*
Adult Prg X Position(1)	.067	1	.067	1.66	.199
Adult Prg X Position(2)	.117	1	.117	2.90	.091
Adult Prg X Position(3)	.350	1	.350	8.62	.004**
Adult Prg	.463	1	.463	11.43	.001***
Position X Adult Prg(1)	.334	2	.167	4.12	.019*
Position X Adult Prg(2)	.036	2	.018	.444	.643
Within cells	4.21	104	.040		

Note: Position 1 = Principal , Position 2 = Superintendent
Position 3 = Vo Ag Instructor
Adult Prg 1 = Existing Secondary Adult Agriculture Programs
Adult Prg 2 = No Secondary Adult Agriculture Programs
* $p < .05$, ** $p < .005$, *** $p < .001$

Objective 6: Determine if differences in attitudes exists between administrators and vocational agricultural instructors when compared by years of experience as an administrator or vocational agriculture instructor.

Funding of adult programs was the only area where years of experience interacted with the position of the respondent. A significant interaction ($p < .001$) was observed between position of the respondent and years of experience as a educator (Table 4). This interaction occurred in the group of respondents having 21 or more years experience in education.

If we look at the mean values for those educators having 21 or more years of experience, the vocational agricultural instructors have significantly more positive mean ratings (2.81) than principals (2.38) and superintendent (2.42). Teachers with 21 or more years experience were also different than the other respondent positions at any other length of experience.

Table 4.
Years of Experience and Respondent Position by Funding of Adult Programs

Source of Variation	S.S.	D.F.	M.S.	F ratio	Prob.
Position	.072	2	.036	.83	.435
Yrsexp X Position(1)	.217	4	.054	1.25	.292
Yrsexp X Position(2)	.286	4	.071	1.65	.166
Yrsexp X Position(3)	.371	4	.092	2.14	.080
Yrsexp	.042	4	.010	.244	.912
Position X Yrsexp(1)	.124	2	.062	1.44	.241
Position X Yrsexp(2)	.062	2	.031	.717	.490
Position X Yrsexp(3)	.012	2	.006	.144	.866
Position X Yrsexp(4)	.038	2	.019	.439	.646
Position X Yrsexp(5)	.646	2	.323	7.46	.001*

Note: Position 1 = Principal , Position 2 = Superintendent
Position 3 = Vo Ag Instructor
Yrsexp 1 = 1-5yrs , Yrsexp 2 = 6-10yrs ,Yrsexp 3 = 11-15yrs,
Yrsexp 4 = 16-20yrs, Yrsexp 5 = 21+ yrs
* $p < .001$

CONCLUSIONS AND RECOMMENDATIONS

The findings of this study support many of the findings of Miller (1985). Miller indicated that superintendents generally had a positive attitude toward adult education in secondary school system in Ohio.

The following conclusions were developed upon completing the review of the statistical information.

1. In rating their own attitude toward adult education in the secondary school 85.4 percent of all respondents indicated a somewhat positive to positive attitude toward offering adult programs in their system.

2. It was observed that 44.9% of vocational agriculture instructors, 32.6% of the superintendents and 25.5% of the principals believed the secondary vocational programs are most responsible for delivery of adult agricultural programs at the local level. Overall 34.5 percent of the respondents believed that secondary program should deliver adult agricultural at the local level.

3. It was concluded that principals and superintendents have very similar perceptions of the need, benefits, operation, and funding of adult education in agriculture, providing uniform administrative agreement.

4. It was observed that vocational agriculture instructors were more likely to be in higher agreement with statements about the benefits and public support for adult education, while administrators are more likely to safeguard traditional school funding and structure.

5. When funding issues were considered, teachers were more likely to agree that adult education should be funded similarly to the secondary system, while administrators viewed adult education as being more self-supportive in nature.

6. When analyzing data by looking at the relationship of position and attitudes, it was concluded that issues associated with the operation and benefits of adult programs may be partly predicted by the degree of positive attitudes of superintendents for adult programs in the secondary system. Funding was negatively correlated to superintendent's attitude.

7. All three respondent groups showed a significant positive correlation between their overall attitude of adult programs and the benefits derived from an adult program.

8. Those instructors with current adult programs view the operation significantly different than administrators who have current programs and different than administrators and instructors who do not have adult programs. Further, administrators having adult programs in their school systems view adult education significantly more positive than any respondent group not having adult education in their school system.

9. In areas related to adult funding, instructors with 21 years of experience or more have significantly greater support than principals and superintendents with the same amount of experience, or other teachers or administrators with less years of experience. Conversely, administrators with 21 years of experience or more have significantly lower agreement with other respondents with less than 21 or more years of experience

Recommendations -- Based on the conclusions of this study, the following recommendations are made:

1. Nebraska Department of Education personnel working in adult education be made aware of the positive attitude of administrators and instructors toward adult education is agriculture in secondary programs.

2. Adult educators at UNL and the State Department of Education work cooperatively with instructors and administrators to prepare guidelines for deliver adult education through secondary vocational agriculture programs.

3. Make use of administrators and instructors currently having adult programs in agriculture to convince others of the value of adult education through secondary programs.

4. Encourage adult education leaders at the state level to work cooperatively with secondary administrators in identifying ongoing sources of funding and support for adult education. These may include the use of locally generated tax dollars or through self-supported program offerings.

5. Encourage local instructors and administrators to discuss differences in opinion and support of adult education to ensure greater chances of success.

6. Develop contractual position description for instructors to teach both traditional day-class students and adult classes in agriculture. Pilot test cooperative adult/day-class programs in schools in different areas on the state and in districts with both large and small secondary enrollment.

7. Conduct additional research investigating the adult student attitude toward the delivery of educational programs through the secondary vocational agriculture program

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COLLEGE ADMINISTRATORS' IMAGE OF THE AGRICULTURAL TEACHER EDUCATION PROGRAMS: A NATIONAL STUDY

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INTRODUCTION

An image is comprised of the subjective knowledge of an individual about a specific object and determines how one behaves toward the object of the image (Boulding, 1966). The image one holds of the teacher education in agriculture program could, therefore, affect how one behaves toward the program. When the persons holding an image and behaving are administrators, the manifestation of the behavior can be of extreme importance to the program.

Image, as a precursor to behavior, has been defined as persistent over time, but amenable to change if considerable pressure is applied; as producing consistent behavior; and as having either a positive or negative direction. These tenets were supported by a cadre of writers (Dillman, 1978; Summers, 1970; Osgood, Suci and Tannenbaum, 1969; Chrisman, 1977; Fishkin, 1967; Remmers, 1972; Thurstone, 1974; Tigert and King, 1971; Dawes, 1972; McKennell, 1974; Shaw and Wright, 1967).

Measurement of the image construct has been investigated (Menezes and Elbert, 1979; Fisk, 1961; Kunkel and Berry, 1968). Image research has evolved from contemporary literature principally in marketing, although scientists, professional groups and higher education "prestige" studies have thematically lapsed into the theory related to the construct. Boulding noted that images are formed and affected by

messages. The messages received may not change the image at all, may change it somewhat, or may produce a revolutionary change. He noted messages are (1) neutral, does not affect image; (2) favorable, easily received; (3) hostile, hard to penetrate image; and (4) certainty, stabilizing the image (1966).

Crunkilton, Miller and Lee (1986) investigated the image of teacher education in agriculture as held by faculty in their three universities. They found ratings of image to be relatively positive, but they concluded there was a need for improvement, particularly in agriculture. They recommended that a study be conducted of the image as held by university administrators.

PURPOSE AND OBJECTIVES

This study was conducted to put into perspective a major concern of agricultural education; specifically, the image of agricultural education as held by administrators of the colleges of agriculture and education. The reason for doing the study was that the knowledge of the status of the image of agricultural education would identify strengths and weaknesses of the programs, and, thereby, illuminate positive aspects of the image and the negative aspects that needed improvement.

The following objectives guided the research study:

1. Describe the image of agriculture teacher education programs (faculty, students, research, services, and general areas of concern) as held by the administrators in the colleges of agriculture and education.

2. Determine differences in image of agriculture teacher education programs as held by the administrators among the colleges, the different regions, and types of institutions.

3. Identify and describe the relationship between specified psycho-social characteristics of administrators in the colleges of agriculture and education and the image they held of the agricultural education programs.

PROCEDURES

The descriptive survey type of research was utilized in this study. Content validity of the instrument was established using a panel of experts. Cronbach standardized reliability coefficient was found to be at the range of .46 to .85. Frame, selection, sampling, measurement, and non-response errors were controlled. Subjects selected for the study were the deans of the colleges of agriculture and education and the associate deans responsible for resident instruction in the institutions. The sampling frame was developed through a stratified (by type of institution and region) random sampling procedure from 360 (N) administrators. A total sample of 160 (n) administrators were involved in this study. Response rate was 83 percent after two mailings; however, 9 percent was unusable. Descriptive, correlational and inferential statistics were utilized.

RESULTS

Administrators (Table 18) in the colleges of agriculture and education held a high image of the faculty (Table 1), services offered (Table 5), and the general areas of concern (Table 6) in agricultural education. However, the images of the students (Table 2), research (Table 3), and the teaching (Table 4) in agricultural education were moderate.

Agriculture administrators held a significantly higher image than education administrators on the faculty and student domains (Tables 7-9). Administrators in the South held a significantly higher image of research than did other administrators in the North, Central, and the West (Tables 10-11). Education administrators in the South held a significantly higher image of research than education administrators in the West (Tables 12-13). Agriculture administrators in the South held a significantly higher image of research than agriculture administrators in the the Central region (Tables 14-15). However, agriculture administrators in the West held significantly higher image of the general areas domain than did agriculture administrators in the South and Northern regions (Table 16). There were no significant differences detected between the image held by administrators in the different types of institutions (Table 17).

Correlation coefficients (Table 19) indicated low to moderate relationships between "contact with agricultural programs" while negligible to moderate relationships were detected between "location of agricultural education department" and the image held by the administrators. There were negligible to low associations between gender, rank, administration experience, college, agriculture or education teaching experience, first degree major, and enrollment in vocational agriculture and the image the administrators held regarding the agricultural education programs.

Some of the conclusions derived from this study were that the images of the faculty, services offered, and the general areas of concern in agricultural education were high. However, the images of the students, research, and the teaching in agricultural education were moderate.

Overall, affiliation with the college of agriculture or education, the regions the administrators were located, and the types of institutions with which the administrators were affiliated did not have major influence on the image the administrators held of the agricultural education programs.

RECOMMENDATIONS

The agricultural education programs were expected to portray a high image. The administrators of the colleges of agriculture and education held a moderate image of the agriculture teacher education programs. If administrators perceived the image to be moderate at best, then, efforts could be made to realize the fullest potential of the image. If an improved image could be possibly acquired, professionals involved in agricultural education should eventually enjoy the benefits of being a collegial partner.

The profession must proceed to determine why our image is as it is. Is it merely because agricultural educators are very specialized in colleges of education and viewed as social scientists in colleges of agriculture. If agricultural educators are to affect the image, the profession must determine its antecedents and proceed to upgrade the image as appropriate.

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Table 1. Image of the Faculty in Agricultural Education by College of Agriculture and Education Administrators

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 62	Education Administrators (# of cases) n = 55	Total (# of cases) n = 117
1. do not really care about their students.*	9.2 (62) 1.7	8.7 (54) 2.3	9.0 (116) 2.0
2. are always well prepared for presentations, meetings, etc.	7.5 (61) 1.9	7.6 (52) 1.9	7.6 (113) 1.9
3. are energetic, aggressive and articulate.	7.7 (62) 1.8	7.1 (55) 1.9	7.4 (116) 1.8
4. make too many compromises for individual students.*	6.5 (57) 2.4	5.2 (44) 2.8	5.9 (101) 2.6
5. are up to date and aware of current developments in their field.	7.5 (59) 1.9	7.6 (52) 2.1	7.6 (111) 2.0
6. exclude others from their group.*	7.3 (60) 2.3	6.1 (52) 2.8	6.7 (112) 2.6
7. are not in control of their destiny and react more than act.*	6.8 (62) 2.4	6.5 (52) 2.5	6.6 (114) 2.4
8. are professional in their appearance.	8.1 (62) 1.8	8.0 (55) 2.0	8.0 (117) 1.9
9. are systematic and structured.	7.6 (59) 1.4	7.4 (51) 1.8	7.5 (110) 1.6
10. are good "team players."	7.8 (61) 1.8	6.9 (53) 2.5	7.4 (114) 2.2
11. lack good scholarship.*	7.1 (60) 2.1	6.0 (54) 2.4	6.6 (114) 2.3

Table 1. Image of the Faculty in Agricultural Education by College of Agriculture and Education Administrators (Continued)

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 62	Education Administrators (# of cases) n = 55	Total (# of cases) n = 117
12. are effective teachers.	8.1 (61) 1.6	7.8 (50) 1.6	7.9 (111) 1.6
13. those who have a lot of ability move out of agriculture into other areas.*	5.6 (60) 2.2	6.3 (48) 2.5	5.9 (108) 2.4
14. are, overall, of poor quality.*	8.3 (61) 2.3	8.2 (55) 1.9	8.2 (116) 2.2
15. conduct themselves in a very professional manner.	8.1 (62) 1.4	7.9 (55) 1.9	8.0 (117) 1.7
16. are good collegial peers.	7.9 (62) 1.5	7.4 (55) 2.1	7.7 (117) 1.9
17. associate only with each other.*	7.1 (62) 2.3	6.0 (55) 2.7	6.6 (117) 2.6
18. are effective problem solvers.	7.0 (59) 1.8	6.4 (49) 1.7	6.8 (108) 1.7
Domain	7.5 (62) 1.1	7.1 (55) 1.2	7.3 (117) 1.2

*Scale values were reversed for negatively-stated items.

Rating Scale

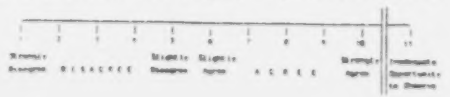

Table 2. Image of the Students in Agricultural Education by College of Agriculture and Education Administrators

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 62	Education Administrators (# of cases) n = 53	Total (# of cases) n = 115
1. follow rigorous programs of study.	5.7 (62) 2.2	5.4 (53) 2.3	5.6 (115) 2.2
2. are scholarly.	5.9 (62) 1.8	4.9 (52) 2.1	5.4 (114) 2.0
3. are of limited ability.*	7.0 (60) 2.0	6.3 (50) 2.0	6.7 (110) 2.0
4. do not compare favorably with other students.*	6.9 (61) 2.3	6.1 (50) 2.3	6.5 (111) 2.3
5. rate higher in leadership skills than most students.	6.5 (61) 2.0	5.8 (47) 2.0	6.2 (108) 2.0
6. are typically in the lower half of a class on most academic endeavors.*	6.9 (60) 1.9	5.4 (45) 2.0	6.3 (105) 2.1
7. possess better human relations skills than most students.	6.8 (60) 2.0	5.6 (44) 2.2	6.3 (104) 2.1
8. are more studious than most students.	5.1 (60) 1.7	4.3 (43) 1.7	4.7 (103) 1.7
Domain	6.3 (62) 1.4	5.5 (53) 1.5	5.9 (115) 1.5

*Scale values were reversed for negatively-stated items.

Rating Scale

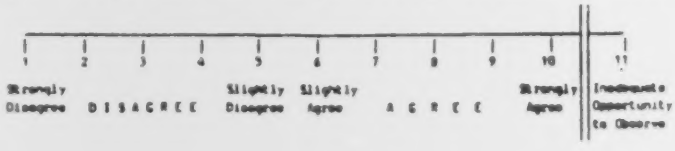

Table 3. Image of the Research in Agricultural Education by College of Agriculture and Education Administrators

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 60	Education Administrators (# of cases) n = 52	Total (# of cases) n = 112
1. Research in agricultural education is disproportionately weighted toward survey methodologies.*	4.0 (57) 2.0	4.3 (39) 2.4	4.1 (96) 2.2
2. Research problems investigated are significant and meaningful ones.	5.7 (60) 1.9	5.8 (44) 2.3	5.8 (104) 2.1
3. Research in agricultural education leaves a lot to be desired.*	4.8 (57) 2.1	4.6 (48) 2.3	4.7 (105) 2.2
4. Research in agricultural education has made significant contributions to knowledge.	5.8 (57) 2.0	5.5 (43) 2.3	5.6 (100) 2.1
5. Research methods in agricultural education are rigorous.	5.3 (56) 1.8	5.5 (44) 2.2	5.4 (100) 2.0
6. Quality research is a concern to agricultural educators.	6.8 (57) 1.7	6.0 (49) 2.4	6.4 (106) 2.1
7. Research is a high priority to agricultural educators.	4.7 (60) 1.9	5.0 (52) 2.6	4.8 (112) 2.3
8. Research in agricultural education attracts funding from granting agencies.	4.6 (57) 2.0	5.2 (44) 2.6	5.8 (99) 2.3

Table 3. Image of the Research in Agricultural Education by College of Agriculture and Education Administrators (Continued)

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 60	Education Administrators (# of cases) n = 52	Total (# of cases) n = 112
9. Interesting agricultural edcuation research attracts graduate students to the program.	6.3 (55) 1.9	5.2 (44) 2.8	5.8 (99) 2.4
10. Research in agricultural education has adequate facilities and equipment.	5.4 (55) 2.1	5.7 (44) 2.2	5.5 (99) 2.2
Domain	5.3 (60) 1.2	5.3 (52) 1.9	5.3 (112) 1.6

*Scale values were reversed for negatively-stated items.

Rating Scale

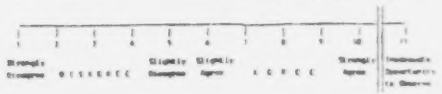

Table 4. Image of the Teaching in Agricultural Education by College of Agriculture and Education Administrators

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 61	Education Administrators (# of cases) n = 53	Total (# of cases) n = 114
1. Courses in agricultural education have a lot of "content" to offer students.	6.2 (59) 1.7	6.6 (51) 1.9	6.4 (110) 1.8
2. Courses in agricultural education have little substance to offer students.*	6.7 (59) 2.0	6.9 (52) 2.0	6.8 (111) 2.0
3. Courses in agricultural education have too much form and not enough content.*	5.8 (59) 2.1	6.5 (50) 2.0	6.2 (109) 2.1
4. Courses in agricultural education are academically challenging.	5.5 (61) 1.6	5.3 (53) 1.6	5.4 (114) 1.6
5. Agricultural educators care too little about theory and are too concerned about "how to."*	5.8 (59) 1.8	4.9 (51) 2.0	5.4 (110) 2.0
6. Agricultural educators are too conciliatory in trying to accommodate students.*	5.7 (59) 1.9	5.0 (51) 2.3	5.3 (110) 2.1
7. High grades are difficult to obtain in agricultural education courses.*	7.6 (57) 1.4	7.5 (52) 1.7	7.5 (109) 1.5
Domain	6.2 (61) 1.3	6.1 (53) 1.2	6.1 (114) 1.2

*Scale values were reversed for negatively-stated items.

Rating Scale

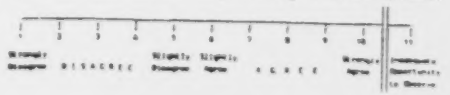

Table 5. Image of the Service in Agricultural Education by College of Agriculture and Education Administrators

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 62	Education Administrators (# of cases) n = 55	Total (# of cases) n = 117
1. Service to teachers, agents and other educators is a high priority in agricultural education.	8.0 (60) 1.6	8.7 (53) 1.3	8.4 (113) 1.5
2. Adequate service to the university and college is provided by agricultural educators.	7.5 (62) 1.6	7.3 (55) 1.7	7.4 (117) 1.7
3. Agricultural educators are more involved with civic and community groups than most faculty.	6.4 (56) 2.2	6.7 (48) 2.2	6.5 (104) 2.2
4. FFA, 4-H and Young Farmer organizations utilize a lot of the time of the agricultural education faculty members.	7.4 (60) 1.7	7.4 (50) 2.1	7.4 (110) 1.9
5. Agricultural educators spend more time serving their clientele (vocational agriculture teachers and county agents) than most educator groups.	8.1 (60) 1.3	7.6 (51) 2.0	7.9 (111) 1.7
6. Service to professional organizations is above the average of other departments.	6.7 (56) 2.0	6.2 (52) 2.2	6.4 (110) 2.1
Domain	7.3 (62) 1.0	7.3 (55) 1.4	7.3 (117) 1.2

Rating Scale

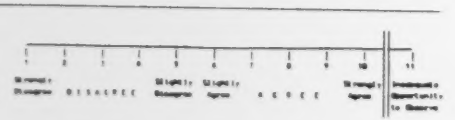

Table 6. Image of the General Areas of Concern in Agricultural Education by College of Agriculture and Education Administrators

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 62	Education Administrators (# of cases) n = 55	Total (# of cases) n = 117
1. Facilities for agricultural education are nicely maintained and attractive.	6.8 (62) 1.6	7.1 (55) 1.5	7.0 (117) 1.6
2. Our agricultural education program is highly respected nationally.	6.4 (59) 2.2	6.4 (50) 2.6	6.4 (109) 2.4
3. Faculty in agricultural education expect courses their students take in other departments to be "watered-down" until there is little substance to them.*	8.0 (59) 2.0	7.6 (51) 1.8	7.8 (110) 1.9
4. Administrators of agricultural education programs are not as effective as those in other areas.*	7.7 (60) 2.4	7.7 (51) 2.3	7.7 (111) 2.3
5. Agricultural education has less public support than most programs in the college.*	6.2 (58) 2.0	6.5 (53) 2.7	6.3 (111) 2.4
6. Agricultural educators are active politically.	5.4 (56) 2.0	6.3 (46) 2.2	5.8 (102) 2.1
7. Facilities for research and teaching are up to date.	5.9 (62) 1.7	6.3 (53) 2.1	6.1 (115) 1.9

Table 6. Image of the General Areas of Concern in Agricultural Education by College of Agriculture and Education Administrators (Continued)

Statement rated	Type of Administrators ($\bar{x}$/S.D.) Agriculture Administrators (# of cases) n = 62	Education Administrators (# of cases) n = 55	Total (# of cases) n = 117
8. Our agricultural education program is highly respected on campus.	6.1 (62) 2.0	5.6 (55) 2.4	5.9 (117) 2.2
Domain	6.6 (62) 1.2	6.7 (55) 1.4	6.6 (117) 1.3

*Scale values were reversed for negatively-stated items.

Rating Scale

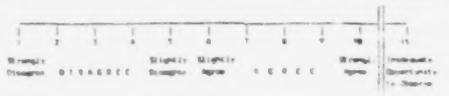

Table 7. Image of Agricultural Education by College Affiliation

Domain	College Affiliation ($\bar{x}$/S.D.) Agriculture (# of cases) n = 62	Education (# of cases) n = 55	Total (# of cases) n = 117	F-Value
1. Faculty	7.5 (62) 1.1	7.1 (55) 1.2	7.3 (117) 1.2	3.28*
2. Students	6.3 (62) 1.4	5.5 (53) 1.5	5.9 (115) 1.5	8.70*
3. Research	5.3 (60) 1.2	5.3 (52) 1.9	5.3 (112) 1.6	.00
4. Teaching	6.2 (61) 1.3	6.1 (53) 1.2	6.1 (114) 1.2	.10
5. Service	7.3 (62) 1.0	7.3 (55) 1.4	7.3 (117) 1.2	.00
6. General	6.6 (62) 1.2	6.7 (55) 1.4	6.6 (117) 1.3	.31

* p<.10

Table 8. Image of Faculty by College Affiliation

	College	
	Agriculture	Education
n	62	55
Mean	7.5	7.1
Standard Deviation	1.1	1.2

Source	D.F.	Sum of Squares	Mean Squares	F
Between	1	4.8	4.8	3.28*
Within	115	170.4	1.4	
Total	116	175.2		

* p<.10

Table 9. Image of Students in Agricultural Education by College Affiliation

	College	
	Agriculture	Education
n	62	53
Mean	6.3	5.5
Standard Deviation	1.4	1.5

Source	D.F.	Sum of Squares	Mean Squares	F
Between	1	20.1	20.1	8.70*
Within	113	261.5	2.3	
Total	114	281.6		

* p<.10

Table 10. Image of Agricultural Education by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

Domain	A.A.T.E.A. Region (x̄/S.D.) East (# of cases) n = 18	Central (# of cases) n = 28	South (# of cases) n = 51	West (# of cases) n = 20	Total (# of cases) n = 117	F-Value
1. Faculty	7.5 (18) 1.0	7.3 (28) 1.0	7.3 (51) 1.2	7.2 (20) 1.5	7.3 (117) 1.2	.15
2. Students	6.2 (17) 1.4	5.6 (28) 1.5	6.1 (51) 1.3	5.8 (19) 2.1	5.9 (115) 1.5	.78
3. Research	4.8 (17) 1.3	4.9 (27) 1.4	6.2 (49) 1.3	4.7 (19) 1.9	5.3 (112) 1.6	5.71*
4. Teaching	6.0 (18) 1.1	5.7 (28) 1.3	6.3 (50) 1.1	6.3 (18) 1.5	6.1 (114) 1.2	1.76
5. Service	7.1 (18) 1.3	7.0 (28) 1.1	7.2 (51) 1.0	7.1 (20) 1.4	7.3 (117) 1.2	2.88
6. General	6.0 (18) 1.4	6.6 (28) 1.3	6.9 (51) 1.2	6.5 (20) 1.3	6.6 (117) 1.3	1.88

* p<.10

Table 11. Image of Research by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

	Region			
	East	Central	South	West
n	17	27	49	19
Mean	S4.9	4.9	6.0	4.7
		S___	___	
			S___	___
Standard Deviation	1.3	1.4	1.3	1.9

Source	D.F.	Sum of Squares	Mean Squares	F
Between	3	39.3	13.1	5.71*
Within	108	248.1	2.2	
Total	111	287.4		

* p<.10

S ___ ___ Parallel lines indicated statistically significant difference between groups of professionals using the Tukey method.

Table 12. Image of Agricultural Education Among College of Education Administrators by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

Domain	A.A.T.E.A. Region ($\bar{x}$/S.D.) East (# of cases) n = 7	Central (# of cases) n = 12	South (# of cases) n = 25	West (# of cases) n = 11	Total (# of cases) n = 55	F-Value
1. Faculty	7.5 (7) .4	7.1 (12) 1.1	7.3 (25) 1.2	6.5 (11) 1.7	7.1 (55) 1.2	1.32
2. Students	6.1 (6) .8	5.0 (12) 1.0	5.9 (25) 1.3	4.7 (10) 2.4	5.5 (53) 1.5	2.20
3. Research	4.7 (6) 1.4	5.0 (12) 1.7	6.1 (24) 1.6	4.1 (10) 2.4	5.3 (52) 1.9	3.27*
4. Teaching	6.2 (7) .5	5.9 (12) 1.4	6.2 (24) 1.1	5.9 (10) 1.5	6.1 (53) 1.2	.28
5. Service	6.8 (7) 1.5	7.0 (12) 1.3	7.9 (25) 1.1	6.9 (11) 1.7	7.3 (55) 1.4	2.22
6. General	6.8 (7) 1.5	7.0 (12) 1.5	6.8 (25) 1.3	6.1 (11) 1.4	6.7 (55) 1.4	.95

* $p<.10$

Table 13. Image of Research in Colleges of Education by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

	Region			
	East	Central	South	West
n	6	12	24	10
Mean	4.7	5.0	S6.1	4.1
Standard Deviation	1.4	1.7	1.6	2.4

Source	D.F.	Sum of Squares	Mean Squares	F
Between	3	32.6	10.8	3.27*
Within	48	159.2	3.3	
Total	51	192.2		

* $p<.10$

S ___ ___ Parallel lines indicated statistically significant difference between groups of professionals using the Tukey method.

Table 14. Image of Agricultural Education Among College of Agriculture Administrators by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

Domain	A.A.T.E.A. Region ($\bar{x}$/S.D.) East (# of cases) n = 11	Central (# of cases) n = 16	South (# of cases) n = 26	West (# of cases) n = 9	Total (# of cases) n = 62	F-Value
1. Faculty	7.5 (11) 1.3	7.4 (16) .9	7.4 (26) 1.2	8.1 (9) .7	7.5 (62) 1.1	.57
2. Students	6.2 (11) 1.7	6.1 (16) 1.6	6.3 (26) 1.3	7.0 (9) .6	6.3 (60) 1.4	.78
3. Research	4.9 (11) 1.4	4.8 (15) 1.2	5.9 (25) 1.0	5.3 (9) 1.1	5.3 (61) 1.2	3.25*
4. Teaching	5.9 (11) 1.3	5.5 (16) 1.3	6.4 (26) 1.1	6.8 (8) 1.3	6.2 (61) 1.3	2.49
5. Service	7.2 (11) 1.2	7.0 (16) 1.0	7.6 (26) .9	7.4 (9) .8	7.3 (62) 1.0	.96
6. General	5.5 (11) 1.1	6.3 (16) 1.2	6.9 (26) 1.1	7.1 (9) 1.0	6.6 (62) 1.2	4.64*

* $p<.10$

Table 15. Image of Research in Colleges of Agriculture by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

	Region			
	East	Central	South	West
n	11	15	25	9
Mean	4.9	S4.8	5.9	5.3
Standard Deviation	1.4	1.2	1.0	1.1

Source	D.F.	Sum of Squares	Mean Squares	F
Between	3	14.1	4.7	3.25*
Within	56	81.1	1.4	
Total	59	95.2		

* p<.10

S ___ ___ Parallel lines indicated statistically significant difference between groups of professionals using the Tukey method.

Table 16. Image of the General Areas of Concern in Colleges of Agriculture by American Association of Teacher Educators in Agriculture (A.A.T.E.A.) Region

	Region			
	East	Central	South	West
n	11	16	26	9
Mean	S5.5	6.3	6.9	7.1
	S___			___
Standard Deviation	1.1	1.2	1.1	1.0

Source	D.F.	Sum of Squares	Mean Squares	F
Between	3	19.2	6.4	4.64*
Within	58	78.8	1.3	
Total	61	99.0		

* p<.10

S ___ ___ Parallel lines indicated statistically significant difference between groups of professionals using the Tukey method.

Table 17. Image of Agricultural Education by Type of Institution

Domain	Type of Institution ($\bar{x}$/S.D.) 1862 Land-grant (# of cases) n = 76	1890 Land-grant (# of cases) n = 10	Non-Land-grant (# of cases) n = 31	Total (# of cases) n = 117	F-Value
1. Faculty	7.4 (76) 1.2	7.3 (10) 1.5	7.2 (31) 1.1	7.3 (117) 1.2	.11
2. Students	5.8 (76) 1.6	6.3 (10) 1.6	6.1 (31) 1.4	5.9 (115) 1.5	.53
3. Research	5.1 (76) 1.6	5.5 (10) 1.6	5.7 20) 1.4	5.3 (112) 1.6	1.41
4. Teaching	6.1 (74) 1.3	6.2 (9) 1.6	6.2 (31) 1.1	6.1 (114) 1.2	.06
5. Service	7.3 (76) 1.2	7.2 (10) 1.4	7.5 (31) 1.1	7.3 (117) 1.2	.57
6. General	6.5 (76) 1.3	6.5 (10) 1.4	7.0 (31) 1.2	6.6 (117) 1.3	1.96

Table 18. Characteristics of the Respondents (n = 118)

	f	%
1. Gender		
Male	111	94.1
Female	7	5.9
2. Academic Rank		
Full Professor	104	88.1
Associate Professor	9	7.6
Assistant Professor	1	0.9
Missing Data	4	3.4
3. Experience as Administrator		
Years		
0- 6	51	43.2
7-12	29	24.5
13-18	21	18.0
19-24	12	10.1
25-30	2	1.7
31-36	1	0.8
Missing Data	2	1.7
4. Experience as Teacher of Agriculture or Education in College or University		
0- 7	11	9.3
8-15	29	24.6
16-23	42	35.6
24-31	23	19.5
32-40	7	5.9
Missing Data	6	5.1
5. Teaching Experience in a Secondary School		
Language Arts English	9	7.6
Social Studies	6	5.1
Biological Sciences	6	5.1
Mathematics/Physics	9	7.6
Health and Physical Education	1	0.8
Vocational Agriculture	13	11.1
Business Education	2	1.7
Home Economics	1	0.8
Industrial Arts	2	1.7
Special Education	1	0.8
Missing Data	3	2.6
Did Not Teach	65	55.1

Table 18. Characteristics of the Respondents, Continued

	f	%
6. Farm Experience		
Had Farm Experience	91	77.1
No Farm Experience	24	20.3
Missing Data	3	2.6
7. Major in B.S. Degree		
Humanities	24	20.3
Biological Sciences	7	5.9
Physical Sciences	15	12.7
Health and Physical Education	8	6.7
Agricultural Education	11	9.3
Home Economics	2	1.7
Industrial Education/Arts/Trade	4	3.4
Distributive Education	2	1.7
Education/Psychology	6	5.1
Technical Sciences	41	34.7
Missing Data	1	.8
8. Enrollment in Vocational Agriculture		
Did Enroll	43	36.4
Did Not Enroll	74	62.7
Missing Data	1	0.9
9. Location of Agricultural Education Department		
Agriculture	62	52.5
Education	55	46.6
Missing Data	1	0.9
10. Direct Contact with Agricultural Education Program		
Frequency		
1- 2	6	5.1
3- 4	11	9.3
5- 6	20	16.9
7- 8	33	28.0
9-10	47	39.8
Missing Data	1	0.9

Table 19. Relationship Between Psycho-Social Characteristics of Administrators and Image of Agricultural Education

Psycho-Social Characteristics	Image of Faculty	Students	Research	Teaching	Service	General
1. Gender[a]	.13	.06	.10	.12	-.12	.16
2. Academic Rank[b]	-.01	.09	.01	.01	.12	-.07
3. Experience as Administrator[c]	.02	.05	.00	.04	.04	.13
4. Experience as Teacher[c]	-.07	-.02	-.03	-.07	-.01	-.04
5. Teaching Experience in Secondary School[a]	.10	.11	.04	.04	.17	.26
6. Farm Experience/Employment in Agriculture[a]	.07	.21	.01	.01	-.02	.07
7. Major in B.S. Degree[a]	.00	.20	-.10	.07	-.04	-.09
8. Enrollment in Vocational Agriculture[a]	.02	.19	.00	.07	.04	.13
9. Location of Agricultural Education Department[a]	-.18	-.24	-.08	-.36	.00	-.13
10. Contact with Agricultural Education Program[c]	.34	.38	.20	.19	.27	.32

a=Point Biserial Correlation

coding: male =1, female =2

subjects taught: Lang. Arts =1, Soc. Sc. =2, Bio. Sc. =3, Mat./Phy. =4, Health & Phy. Ed. =5
Voc. Ag. =6, Bus. Ed. =7, Hom. Ec. =8, Ind. Arts =9, Sp. Ed. =10, Missing = 11, did not teach =0

no farm experience =1, have farm experience =2

major in B.S. degree: Hum. =1, Bio. Sc. =2, Phy. Sc. =3, Health & Phy. Ed. =4, Ag. Ed. =5, Hom. Ec. =6
Ind. Ed. = 7, Disc. Ed. =8, Ed./Psyc. =9, Tech. Sc. =10, Missing =11

did not enroll in voc. ag. in high school =1, enrolled =2

location of Ag. Ed.: Ag. =1, Ed. =2

b=Spearman Rank Correlation

coding: Full Prof. =1, Asso. Prof. =2, Asst. Prof. =3, Other =4

c=Pearson Correlation

CRITIQUE

Marketing Agricultural Education

by

Mary Anne Casey, Gary Leske, and Richard Krueger

Attitudes of Nebraska Superintendents, Principals, and Vocational Agriculture Instructors About the Delivery of Adult Education Through Secondary Vocational Agriculture Programs

by

Michael Adelaine and Richard M. Foster

College Administrator's Image of the Agricultural Teacher Education Programs: A National Study

by

Larry Miller, John R. Crunkilton, Jasper L. Lee, and Marietta Dlamini

Concurrent Session A, February 23, 1987
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Chicago, Illinois

Discussant
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MARKETING AGRICULTURAL EDUCATION

by

Mary Anne Casey, Gary Leske, and Richard Krueger

The purpose of this study was to obtain information to assist in marketing the agricultural education major at the University of Minnesota. I found this to be an intriquing piece of research to critique, primarily because of the practical nature of the study and the focus group interview technique used to gather data. Qualitative research techniques are slowly becoming more accepted in education, and this study presented a good example of appropriate application of focus group interviews.

The paper described several positive dimensions of the study. The objectives were clearly stated, and each appeared to have been accomplished during the conduct of the study. The study was undertaken in response to a real problem in present day agricultural education. The major findings of the study were clearly presented, and conclusions appeared to be well-supported. Although recommendations were not specifically stated, they were implied through the description of actions already taken as a result of the study. Appropriately, the researchers made no attempt to generalize the findings to other settings or populations. I believe this study, both in terms of findings and research procedures, should be of general interest to teacher educators in agriculture.

The following points are raised and suggestions offered that may be useful in conducting and reporting similar studies in the future:

(1) What was the specific research problem under investigation? To improve clarity I generally like to see an outright problem statement included in the paper. I assume the research problem was that fewer students are selecting agricultural education programs at the baccalaureate level. Is this a problem unique to the University of Minnesota? What data are available that support the presence of this problem?

(2) Most of the related literature described applications of the focus group interview technique in private industry settings. However, no previous studies were cited that examined factors influencing students' decisions regarding institutional preference and area of study. The literature review basically ignored the research problem and focused on the research method instead. Has the University of Minnesota gathered any data on high school students' perceptions of the university? What research has been done in agricultural education that is relevant to this research problem?

(3) Information was provided that described the general procedures used to conduct this study. However, I felt that several of the procedures should have been better supported by literature. Since focus group interviews are somewhat novel as a research technique in agricultural education, I also felt a need for a more detailed description of the procedures. The following procedural questions surfaced:

a. Why were students from small rural schools only selected for the group interviews?

b. Was a target population consisting of college bound high school juniors enrolled in agriculture considered?

c. Were there indications of "users" and "nonusers" of the "product" in each group?

d. How were FFA advisors selected? How many responded? What was known about the students prior to the session?

e. Where were the group interviews held?

f. How were the moderators trained? Did the same person moderate each group? Why were assistant moderators present?

g. What were the results of the pilot test?

h. What were the students told beforehand about the nature/purpose of the session?

(4) The findings indicated students were most concerned about cost, size and location when selecting a college or university. I'm sure the researchers expected these findings. I would encourage the researchers to also give attention to the finding that suggested personal on-campus visits and acquaintance with current and former students reduce levels of apprehension in prospective college students.

This study may help open the door for additional qualitative research efforts in agricultural education, and I commend the researchers for their novel approach to this research problem.

ATTITUDES OF NEBRASKA SUPERINTENDENTS, PRINCIPALS, AND VOCATIONAL AGRICULTURE INSTRUCTORS ABOUT THE DELIVERY OF ADULT EDUCATION THROUGH SECONDARY VOCATIONAL AGRICULTURE PROGRAMS

by

Michael F. Adelaine and Richard M. Foster

The purpose of this study was to determine the attitudes held by Nebraska superintendents, principals, and vocational agriculture instructors about the delivery of adult agricultural education programs within the public secondary school system. I commend these researchers for conducting a significant research study in an area of critical need. The adult education component of agricultural education has been at the crossroads for a number of years, and more research is clearly needed in order to guide future practice in the best possible way.

As I studied the paper, I identified several major strengths that I would like to highlight. The purpose and objectives of the study were clearly stated. The procedures for examining the validity and reliability of the survey instrument were satisfactory, although some references suggest that at least a five point response scale is needed when using Cronbach's Alpha to estimate the internal consistency of the instrument. An acceptable reliability coefficient of .78 was calculated. Thus, measurement error was minimized. Sampling error was also not a threat to the internal validity of the study. Frame error appeared negligible, although it was unclear if specific names of administrators were secured. Finally, nonresponse error was addressed, although some unanswered questions still remain regarding follow-up procedures. Overall, a very high response rate was obtained. Survey research appeared to be entirely appropriate in responding to the stated objectives and purpose of the study.

The following questions and discussion are raised for the purpose of strengthening similar research efforts in the future:

(1) The introduction provided a good description of the changing trends and demographics in Nebraska secondary agricultural programs. However, I was unable to locate a precise statement of the problem under investigation. Also, a more extensive discussion of related literature was needed to provide a better foundation for the study. No studies were cited that examined teachers' opinions regarding adult education. Only two studies dealing with administrators' attitudes were discussed.

(2) The paper contained numerous grammatical errors, and I found several sections of the paper, particularly the procedures and findings, to be difficult to follow.

(3) The number of subjects in the population was not directly reported. Why was a 43 percent sample drawn? A phone call was made to those participants who had not responded to the first two mailings. Were these participants considered nonrespondents? What was done to obtain data from the remaining 7.6 percent of the population? How many respondents from each group were included in the data sample?

(4) I had several questions regarding statistical analysis procedures. The researchers derived a mean score for each group on each of the 30 attitude statements. They correctly recognized the inflating effects of multiple t-tests on the Type I error rate. However, I was unsure where t-tests were used and where ANOVA was used to examine the data. The 30 items were grouped into four areas, and in some cases items did not seem to reflect the area specified. I failed to see how the grouping of items affected the concern for an inflated alpha level, since ANOVA appeared to be used to compare means from the three groups.

I was confused about the need for objective four and also the corresponding calculation of correlation coefficients. I felt that several items under the "operation" category addressed the question of attitudes toward adult education programs at the secondary level. Also, practical interpretation of the correlation coefficients presented in Table 2 was difficult, since the category variables were composite scores.

The language used to describe the MANOVA analysis was somewhat confusing. For example, MANOVA procedures were said to examine the interaction of stated independent variables, rather than focusing on the means of the dependent variables. Were all assumptions of the MANOVA procedure met? Due to the nature of the dependent variables, I also question the practical significance of the findings reported as a result of MANOVA procedures. Perhaps a more straightforward approach involving correlations and regression analysis would have been less cumbersome.

(5) I found support in the findings for most of the conclusions, as stated in the paper. However, I had difficulty locating the supporting evidence for conclusion 4 and 9. Conclusion 6 speaks of predicting attitudes, which was not a stated objective of this study.

Finally, several of the recommendations seemed in conflict with reported findings. For example, administrators were said to have positive attitudes toward adult education in agriculture at the secondary level, yet only 29 percent of administrators listed secondary programs as the best setting for adult education. Also, all three groups agreed with the statement that "current vo-ag instructors do not want to teach adult programs." Recommendation 6 suggests daytime adult classes, yet administrators tended to disagree with that practice.

A final question - how much were the attitudes of administrators and teachers due to or based upon their perceptions of current day efforts? In other words, how did their "frame of reference" (and the quality of such) affect their attitudes?

COLLEGE ADMINISTRATORS' IMAGE OF THE
AGRICULTURAL TEACHER EDUCATION PROGRAMS:
A NATIONAL STUDY

by
Larry Miller, John Crunkilton, Jasper Lee, and Marietta Dlamini

I enjoyed reviewing this paper because of the nature of the research problem and the systematic procedures used throughout the study. The purpose of this study was to examine the image of agricultural education as held by administrators of colleges of agriculture and education across the United States. I commend the researchers for addressing a problem of national significance with everyday implications. Furthermore, the paper was clearly written, well organized, and consistent from beginning to end.

I felt this paper had many positive elements that should be discussed. I was particularly pleased to see the paper begin with a definition of "image". A number of works were cited that created a defensible basis for pursuing the study. I did notice, however, that no "image" studies were included in the introductory discussion. A clear statement of the problem was presented, and the objectives were clear and consistent. This study built upon previous research completed by three of the authors of this report.

The research procedures employed were appropriate in relation to the stated objectives. Content validity of the survey instrument was established, and appropriate procedures were used to estimate reliability. Potential survey research errors were accounted for in the study, with the possible exception of nonresponse error. An 83 percent return rate was achieved. Appropriate procedures were used for data analysis, and the findings were presented in a clear, straightforward manner. This was a well done study in many respects.

As I reviewed the paper, the following points of discussion and suggestion were identified:

(1) The procedures section of the paper was extremely brief. I felt more information was needed in several areas, including determination of sample size, rationale for sample stratification, pilot test procedures, and nonresponse follow-up procedures. Although the authors stated that nonresponse error had been controlled, I was unsure if data were actually acquired from a selected sample of the approximately 27 nonrespondents. Also, some of the reliability coefficients were extremely low. Was a pilot test performed to establish reliability and make revisions in the instrument? I noted that a fairly large percentage (9%) of returned surveys was not usable. More information was needed on the instrument development procedures.

(2) I felt the paper could have benefited from a more balanced proportion of tables and discussion. Although the 19 tables included in the paper were relevant, little room was left for

supporting narrative. Only one page was used to discuss results and present conclusions and recommendations. I especially felt the conclusions and recommendations presented did not do justice to what I thought was an excellent study. The level of significance for the correlations in Table 19 was omitted, and reference citations were incomplete in the paper I received.

(3) Overall, administrators' image of agricultural education was described as "high", and images of students, research, and teaching were described as "moderate". After examining the tables, I would suggest that the terms "positive" and "mixed", respectively, might be more accurate. I would tend to disagree with the conclusion that college affiliation or AATEA region did not have a major influence on program image. Agricultural administrators felt significantly better about faculty and students, and administrators in the Southern region consistently felt more positive about research efforts in agricultural education.

(4) The final paragraph began, "The profession must proceed to determine why our image is as it is". I felt that in many ways this study answered this concern. The study found that administrators believed that (a) our students are of lower quality, (b) research in agricultural education is not important enough or rigorous enough, (c) research is a low priority for agricultural educators, and (d) the less than desirable image of teaching is based upon a perception of "easy" course content. Furthermore, while service involvement was rated high, extensive service activities may be a weakness, not a strength, in the eyes of college administrators. Keep in mind that nearly 75 percent of the administrators were located at land grant institutions (noted for their research productivity). Only 15 percent of the administrators had secondary teaching experience in an area of vocational education. Perhaps the image of agricultural education held by college administrators is a symptom of the value placed on teacher education in general, and vocational teacher education in particular.

COMPUTER SKILLS NEEDED BY SECONDARY AGRIBUSINESS STUDENTS

by

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INTRODUCTION

There is a need for students to understand the uses of computers in their lives (Bork, 1982; Kling, 1982). Computers are serving the needs of society in many ways, including financial management, payrolls, recordkeeping and data processing (Leising and Wilkins, 1981; Harris, 1985). Many businesses are totally reliant on computer systems, and more are becoming so each day. As the agribusiness world becomes increasingly dependent upon new technology, students entering agribusiness occupations may need competence in using computers. One of vocational education's main purposes should be helping students develop the technical skills required to make use of computer technology as an occupational tool (Camp, 1983).

Although the number of computers used in high schools has increased dramatically in recent years (Komoski, 1984), little information exists about specific computer skills which students need for entry level employment in agribusiness occupations. A specific set of goals and objectives should be identified for computer education needed by students. These goals and objectives should be based on job entry skills required by agricultural industry.

While many studies have been conducted on the uses of computers, little research has been conducted to determine computer skills which should be incorporated into an agribusiness curriculum to help students become more employable. A list of these computer skills and employers' and teachers' ratings of their importance will help teachers plan and implement effective programs to help students become more competent in using computers.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine what computer skills are needed by students for entry level employment in an agribusiness occupation. The following research questions were studied:

1. What are employers' perceptions of the importance of selected computer skills for entry level employees in agribusiness occupations?
2. How frequently are selected computer tasks performed in agribusinesses?
3. What are teachers' perceptions of the importance of selected computer skills for entry level employees in agribusiness occupations?
4. What computer skills are agribusiness teachers presently teaching students?
5. What is the difference between employers' and teachers' perceptions of the importance of selected computer skills for entry level agribusiness occupations?

METHODOLOGY

The design for the study was descriptive survey. The investigators studied the perceptions of the target population on certain pre-chosen items. Cause and effect were not determined.

Teachers of vocational agribusiness and employers of vocational agribusiness students during the 1985-86 school year were the target

populations for the study. To develop a frame, agribusiness teachers were identified using the 1985-86 Ohio Agricultural Education Directory. The number of agribusiness teachers identified in the directory was 36. The teachers were asked to list the names and addresses of the agribusinesses that employed their students. After a follow-up letter and telephone calls to all those who had not responded, 25 of the teachers agreed to assist with the study. The main reason cited for not assisting with the study was a school policy which would not allow the teachers to release the names of the employers. The number of employers identified by the 25 teachers was 265. The list of employers was reviewed by the researchers to eliminate non-agribusiness job stations (e.g., fast food restaurants, car dealers, hotels, dry cleaners, and service stations), on-farm job placement, and job stations which had insufficient mailing addresses. This review resulted in the elimination of 170 job stations identified by the agribusiness teachers and left a purposive sample of 95 employers.

The instrument used in the study was designed by the investigators based on instruments found in related literature (Bowen & Cheatham, 1986; Sherman, 1986). Content validity was determined by a panel of experts consisting of teacher educators and computer education experts. An initial pilot test was conducted using a group of 20 educators and former vocational employers. Two weeks later, test/retest reliability percentages were calculated using ten of the subjects from the initial pilot test. Percent agreement for individual questions on the instrument ranged from 50% to 80% agreement on the retest (50% agreement - one question; 60% agreement - two questions; 70% agreement - three questions; 80% agreement - four questions).

The instrument consisted of 10 computer skills to be rated by the employers and teachers on a four-point Likert-type scale ranging from "not important" to "very important." The 10 selected skills were: basic skills (turning the computer on and off, inserting a diskette); use a word processing program for tasks such as letters and reports; use an electronic mail program; use a data base manager for tasks such as maintaining inventory; use a spreadsheet for tasks such as keeping financial records and payrolls; use an integrated software package for tasks involving word processing, data base managers, and spreadsheets; make minor changes in an existing program; use mailing list software for tasks such as billing customers; use programming languages such as BASIC, PASCAL, or PILOT to write programs; and use statistical packages for data analysis. The teachers were asked to indicate the amount of time they spent teaching the skills and the employers were asked to indicate the amount of time their employees spent performing the skills.

The instrument was mailed to the 95 employers and to the 36 agribusiness teachers in April, 1986. A follow-up letter and instrument were mailed to the employers and teachers in May, 1986. By the cutoff date, 31 of the 36 teachers had returned usable questionnaires for a response rate of 86%, and 59 of the 95 employers had returned usable questionnaires for a response rate of 62%. The returns were dichotomized into two groups, those responding before and those responding after the follow-up letter, and the two groups were compared statistically to investigate non-response error (Miller & Smith, 1983). A Chi-Square test for independence showed no statistically significant

differences between early and late respondents for employers or teachers on the variables included in the study. Based on this test, non-respondents appear to be no different than respondents on the variables included in the study.

Descriptive statistics were used to describe the teachers' and employers' ratings of the importance of each computer skill for entry level employment in an agribusiness occupation, to describe the frequency with which selected tasks are performed in an agribusiness, and to describe the amount of time teachers spent teaching selected computer skills. Inferential statistics were used to determine the differences between teachers' and employers' ratings of the importance of each skill.

RESULTS

Employers

Of the 59 employers who returned the questionnaire, 26 (44%) owned or leased a computer and six planned to buy a computer within the next year. Only four of the 59 employers reported that the agribusiness student employee used the computer. The students who used the computer in their job placement performed such tasks as keeping budgets, maintaining employee files, finding parts, spreadsheet operation, database operation, mail lists, and checking groceries.

Employers were asked to rate the importance of selected computer skills for entry level employees. The top five skills as rated by the employers are illustrated in Table 1. Using programming languages had the lowest mean score for importance (1.61).

The 26 employers who owned a computer were asked to identify the frequency with which selected computer skills were performed by someone in their agribusiness. The most frequently performed skills were, in rank order,: basic skills, use a data base manager, use a spreadsheet, use integrated software package, and use mailing list software.

Table 1
Employers' Perceptions of the Importance of Computer Skills for Entry Level Employment

Rank	Skill	Mean	S.D.
1	Use data base manager	2.31	1.24
2	Basic skills such as turning computer on/off and inserting a diskette	2.26	1.31
3	Use a spreadsheet	2.10	1.25
4	Use a word processing program	2.07	1.16
5	Use an integrated software package	1.95	1.12

Note. Scale: 4 = very important, 3 = moderately important, 2 = slightly important, and 1 = not important.

Teachers

Of the 31 teachers who returned the questionnaire, 22 (71%) replied that they teach a unit on using computers to their agribusiness students while 27 (87%) responded that they had at least one computer available for instruction.

Teachers were asked to rate the importance of selected computer skills for entry level employment in an agribusiness occupation. The top five skills as rated by the teachers are shown in Table 2. The skill with the lowest mean score was using programming languages (1.92).

The teachers who taught a unit on using computers specified the number of days they spent teaching selected computer skills. The five skills which teachers spent the most time (days) teaching were, in rank order,: word processing, use of spreadsheet, basic skills, use of data base manager, and use of programming languages.

Teachers and employers generally agreed on the most important and least important computer skills for entry level employment, with negligible differences in rank order (Spearman rho = .93). However there were differences between teachers and employers with regard to the value of perceived importance. The teachers rated all of the skills higher than the employers. For eight of the 10 computer skills, teachers' perceptions of importance were statistically higher than the employers' perceptions of importance (alpha = .05). Both groups perceived the application of software as more important than programming skills.

Table 2
Teachers' Perceptions of the Importance of Computer Skills for Entry Level Employment

Rank	Skill	Mean	S.D.
1	Basic skills such as turning computer on/off inserting a diskette	3.67	.78
2	Use a word processing program	3.26	.71
3	Use a data base manager	3.12	.82
4	Use a spreadsheet	3.08	.94
5	Use mailing list software	2.85	.77
6	Use an integrated software package	2.85	.83

Note. Scale: 4 = very important, 3 = moderately important, 2 = slightly important, and 1 = not important.

CONCLUSIONS and RECOMMENDATIONS

The following conclusions were drawn as a result of the findings of the study:

1. Less than one-half of the responding employers owned a computer.
2. Few agribusiness students used the computer at their job placement stations.
3. The employers perceived the selected computer skills as "slightly important" or "not important" for entry level employment.
4. Agribusiness teachers were providing instruction on the use of microcomputers and over three-fourths of the responding teachers had access to a computer.
5. The teachers perceived the selected computer skills as "moderately important" to "very important" for entry level employment.

6. The teachers and employers ranked knowledge of basic skills and using a data base manager, spreadsheet, and word processing programs as the most important skills for entry level employment.

Because a purposive sample was taken, the data are not generalizable to all employers of agribusiness students in the state. Therefore, the researchers recommend that agribusiness teachers analyze individual job stations, including interviews with employers, to determine specific computer skills needed for entry level employment in agribusiness occupations in their area.

Additional research should be conducted to determine the sources of variance between teachers' perceptions of important skills needed and employers' perceptions of important skills needed by entry level employees in an agribusiness occupation. Agribusiness teachers should determine if their perceived importance of computer skills is justified, or if the current trend toward "computer literacy" has influenced their perceptions of the importance of computer skills for entry level employment.

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EVALUATION OF A MICROCOMPUTER SIMULATION TEACHING STRATEGY

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INTRODUCTION

Microcomputers have become common tools in Missouri vocational agriculture programs. In 1985, Chapman reported that 196 of 244 (80%) Missouri vocational agriculture programs had at least one microcomputer. Although many vocational agriculture programs had access to this new technology, relatively few instructors have utilized this tool extensively in their instructional programs. Malpiedi, Papritan, and Lichtensteiger (1985) noted that teachers indicated the ability to use computer-assisted instruction (CAI) programs was important, but in practice seldom used. The same study reported that most frequently, vocational agriculture teachers have used microcomputers for word processing and record keeping functions rather than for CAI.

CAI has been defined as an interactive process during which the computer presents information and receives, analyzes, and reacts to responses provided by students on an individual basis (Hallworth and Brebner, 1980). Zahniser, Long, and Nasman (1984) reported that there has been a significant amount of research which examined the effectiveness of CAI with mainframe computers. However, the differences between microcomputers and mainframe computers are distinct enough to warrant examination of CAI with microcomputers.

Foster and Miller (1985), Henderson (1985) and Malipiedi, Papritan and Lichtenstieger (1985) have completed studies which surveyed vocational agriculture educators concerning the use of microcomputers. These studies indicated CAI is important to agricultural instructors. However, further research was necessary to determine the effect of CAI on student achievement.

Reports of empirical research examining the effectiveness of using microcomputers for instruction, particularly with simulations, were limited in the literature. Roblyer (1985) supported the need for such studies when he wrote, "The impact of simulations on learning have been widely hypothesized for many content areas but rarely researched" (p. 41). Therefore, the focus of this study was to experimentally assess the effects of using microcomputers in vocational agriculture instructional programs.

PURPOSE AND OBJECTIVES

The purpose of this study was to assess the effectiveness of instruction utilizing a lecture/discussion teaching strategy which incorporated the use of a microcomputer simulation program in contrast to a lecture/discussion teaching strategy in selected vocational agriculture classes. Specific objectives were to ascertain:

1. Is there a difference in student achievement when students are taught using the lecture/discussion teaching strategy as compared to a lecture/discussion teaching strategy which incorporates a microcomputer simulation program, when previous knowledge of the subject is equalized?

2. Is there a significant relationship between student achievement and selected student characteristics in each treatment group?

3. Is there a difference in the strength of the relationship between student achievement and selected student characteristics between treatment groups?

4. To what extent does the treatment or any of the student characteristics examined account for a significant portion of the variance associated with the post-test achievement scores?

Student characteristics examined in objectives 2, 3, and 4 were academic rank, microcomputer experience, farm experience, soil management experience, grade level, gender, and knowledge about soil erosion. The following null hypotheses were developed to address each of the above objectives:

Ho_1: No significant difference existed between group mean post-test achievement scores of students taught via a lecture/discussion teaching strategy and those taught via a lecture/discussion teaching strategy which incorporated a microcomputer simulation program when previous knowledge of the subject was equalized.

Ho_2: No significant relationship existed between the post-test achievement scores of students and the independent student characteristics examined for each treatment group.

Ho_3: No significant difference existed in the strength of the relationship between post-test achievement scores for students and the independent student characteristics between the two treatment groups.

Ho_4: No treatment or student characteristic accounted for a significant portion of the variance associated with post-test achievement scores.

PROCEDURES

This study involved vocational agriculture students who were randomly assigned to two treatment groups. The comparison group was taught using a lecture/discussion teaching strategy, and a microcomputer treatment group was taught using the lecture/discussion strategy with a portion of the lesson replaced by a microcomputer simulation program.

This study required selected vocational agriculture teachers to teach two lessons. The first lesson focused on the general topic of soil erosion to establish a subject matter base for participating students. The second lesson constituted the experimental treatment and focused on use of the universal soil loss equation.

Population

This report presents a portion of a larger study which was conducted by Agricultural Education faculty members at the University of Missouri-Columbia. The broader study examined four teaching strategies, a lecture/discussion (comparison group) with three teaching strategies utilizing different microcomputer assisted instructional components. This report will be limited to an assessment of a teaching strategy which incorporated a microcomputer simulation component.

The broader study was the determining factor in calculating the sample size and the number of students involved in each treatment group. The total population consisted of 5,784 junior and senior vocational agriculture students in Missouri (Heiman, 1986). A cluster sampling technique was used. Thirty-six of the 245 Missouri vocational agriculture programs listed in the Vocational Agriculture Teachers Directory (1985-86) were randomly selected to be part of the sample. Krejecie and Morgan (1970) provided an objective method for determining the appropriate sample size when the size of the population is known. From the Krejecie and Morgan table it was determined that the sample size for the combined study should be 360 students. The average class size was estimated to be ten students. From this estimate, it was determined that classes from 36 Missouri vocational agriculture programs would be included in the study. A minimum class size of eight students was established for all programs which participated in the study. Programs with less than eight students enrolled in a relevant course were eliminated from the study and replacement programs were randomly selected. Students in each program selected were randomly assigned to the four treatment groups in approximately equal numbers to control for anticipated differences in the effectiveness of individual teacher participants.

Instrumentation

Software used in the microcomputer simulation teaching strategy was created specifically for this study by a microcomputer consultant in the Missouri State Department of Elementary and Secondary Education. The simulation software program was evaluated by a panel of computer experts in the College of Education at the University of Missouri-Columbia. Panelists examined the program's construction and agreed to its suitability as a simulation. The content of the program was based on information obtained from the University of Missouri-Columbia Extension Publication, "Estimating Soil Losses in Northern Missouri" (Science and Technology Guide #1560).

Lesson plans and achievement test instruments for each lesson were prepared by a team of graduate students at the University of Missouri-Columbia. The two lesson plans, related tests, and microcomputer simulation program were reviewed by a second panel of experts consisting of Agricultural Education, Agronomy, and Agricultural Engineering faculty

members at the University of Missouri-Columbia. This panel examined and approved the construct and content validity of the lesson plans and achievement test instruments. A pilot test was conducted prior to the experiment to assess the procedures planned for the study. Appropriate adjustments were made in the procedures, content, and construction of the instruments according to the recommendations of the reviewers and as a result of the pilot test.

The study required five consecutive class periods at each participating school. Students in both treatment groups were taught the lesson focusing on soil erosion by the local instructor with lesson plans provided by the investigator during the first two class periods. At the conclusion of the first lesson on soil erosion, students completed a pre-experiment achievement test.

The local instructor taught the second lesson which focused on the use of the universal soil loss equation to students in both treatment groups during the third and fourth class periods. Both treatment groups were taught together for the majority of the lesson. However, students selected for the microcomputer simulation treatment group were removed from the classroom setting during the discussion portion of the lesson which involved the development of localized soil erosion problems. Students assigned to the microcomputer treatment group were allowed twenty minutes of instruction utilizing the microcomputer simulation program. The microcomputer simulation program presented problems similar to those which were being developed by the local instructor with the comparison group in the classroom. At the completion of the twenty minute time period, students assigned to the microcomputer treatment group returned to the classroom for the summary and conclusion portion of the lesson. Both groups of students completed an achievement test over the second lesson and a student demographic information instrument during the fifth class period. Data reflecting individual student academic class rank were obtained from the high school counselor in each respective school.

This study utilized a between-subjects, after-only research design. Analysis of covariance was used to test the first hypothesis in this study. Correlation coefficients were calculated to assess the relationship between dependent and independent variables for the second hypothesis. The third hypothesis was tested by using a Z transformation procedure to determine if the r values calculated on the same student characteristics differed significantly between treatment groups. A step-wise multiple regression procedure was used to test hypothesis four. The .05 alpha level was used with each of the statistical procedures employed in this study.

RESULTS

A total of 144 secondary students from 31 randomly selected Missouri vocational agriculture programs provided usable data for analysis. The major factor contributing to non-participation by students from the original sample was due to student absences. Plans to follow up non-participants were rejected as it was not feasible to repeat the experiment in the selected schools.

Reliability coefficients were calculated for the two achievement tests as a part of the study. The resulting Chronbachs' Alpha reliability coefficient was .73 for the first lesson achievement test and .76 for the second lesson achievement test.

Table 1 summarizes student demographic information collected as part of this study. Both treatment groups were similar for the characteristics examined. The sample consisted of approximately 80% male and 20% female participants with approximately 50% having microcomputer experience, 80% having farm experience, and 60% having soil management experience.

Table 1: Summarized Student Demographic Information

Characteristic	Comparison group N	Comparison group %	Microcomputer group N	Microcomputer group %	Total N	Total %
Gender						
Male	57	39.86	57	39.86	114	79.72
Female	14	9.79	15	10.49	29	20.28
Total	71	49.65	72	50.35	143	100.00
Grade level						
Senior	41	28.67	35	24.48	76	53.15
Junior	28	19.59	33	23.08	61	42.66
Sophomore	2	1.40	4	2.80	6	4.20
Total	71	49.65	72	50.35	143	100.00
Previous microcomputer experience						
Yes	37	25.69	40	27.78	77	53.47
No	35	24.31	32	22.22	67	46.53
Total	72	50.00	72	50.00	144	100.00
Farm experience						
Yes	59	40.97	58	40.28	117	81.25
No	13	9.03	14	9.72	27	18.75
Total	72	50.00	72	50.00	144	100.00
Soil management experience						
Yes	43	29.86	42	29.17	85	59.03
No	29	20.14	30	20.83	59	40.97
Total	72	50.00	72	50.00	144	100.00

Table 2 presents academic rank and achievement test scores for the two treatment groups. Academic ranks were converted to percentile ranks with a range of 99.11 to 1.37. Test scores consisted of the number of correct answers provided by each student. Students in each treatment group completed identical 20 item tests at the conclusion of the first lesson on

soil erosion. The comparison group produced a mean score of 13.43 with a standard deviation of 3.67. The microcomputer treatment group produced a mean score of 13.96 with a standard deviation of 3.14. Following the treatment, both groups of students completed a 17 item post-experiment achievement test over the universal soil loss equation. The comparison group produced a mean score of 12.18 and a standard deviation of 3.52 while the microcomputer treatment group produced a mean score of 12.86 and a standard deviation of 3.30.

Table 2: Student Academic Rank and Instrument Scores

Characteristic	N	Mean	Standard deviation	Low value	High value
Academic rank (percentile ranks)					
Comparison Group	68	44.48	24.20	1.37	97.22
Microcomputer Group	66	47.62	25.05	3.45	99.11
Total	134				
First lesson achievement test score					
Comparison group	72	13.43	3.67	5.00	20.00
Microcomputer group	72	13.96	3.14	7.00	19.00
Total	144				
Post-test achievement score					
Comparison group	72	12.18	3.52	2.00	17.00
Microcomputer group	72	12.86	3.30	3.00	17.00
Total	144				

The first hypothesis was developed to ascertain if there was a significant difference between the post-test achievement mean scores of the two treatment groups when differences in previous knowledge of soil erosion were controlled. The results of the analysis of covariance procedure are reported in Table 3. The analysis of covariance procedure revealed no significant difference between the mean scores of the comparison and microcomputer treatment groups when the effect of previous knowledge of soil erosion was equalized. The hypothesis was not rejected.

The second hypothesis was developed to assess the relationship between student post test achievement scores and selected student characteristics in each treatment group. The independent student characteristics examined were as follows: a) student academic rank, b) first lesson achievement test score, c) grade level, d) microcomputer experience, e) farm experience, f) soil management experience, and g) gender. This hypothesis was tested by calculating correlation coefficients for each independent variable (i.e. student characteristics) and the dependent (post-test achievement score) variable. The results of the correlation computations are reported for each treatment group in Table 4.

Table 3: Analysis of Covariance of Posttest Achievement Scores by Treatment Group

Source	Degrees of freedom	Sum of squares	Mean square	F value	Probability
Covariate (pre-experiment test score)	1	661.44	661.44	92.98	0.0001
Main effect (treatment)	1	4.39	4.39	0.62	0.4338
Error	141	1004.11	7.12		
Total	143	1669.94	11.68		

Table 4: Relationship of Post-Test Achievement Scores and Selected Student Characteristics

Characteristic	N	Correlation coefficient	Probability $r \neq 0$
Comparison group			
Academic rank	68	0.43827	0.0002*
First lesson achievement Test score	72	0.62902	0.0001*
Grade level	71	-0.09861	0.4133
Microcomputer experience	72	0.30482	0.0092*
Farm experience	72	-0.17213	0.1482
Soil management experience	72	-0.03862	0.7474
Gender	71	-0.19812	0.0977
Microcomputer group			
Academic rank	66	0.17133	0.1690
First lesson achievement Test score	72	0.62510	0.0001*
Grade level	72	-0.04040	0.7362
Microcomputer experience	72	-0.01231	0.9183
Farm experience	72	-0.04220	0.7248
Soil management experience	72	0.23047	0.0515
Gender	72	-0.14684	0.2184

*Significant at the .05 level.

The correlation coefficients computed for the comparison group indicated significant relationships between post-test achievement scores and the following independent student characteristics: academic rank, first lesson achievement test score, and microcomputer experience. Students with higher academic ranks, higher first lesson achievement scores, and microcomputer experience generally had higher scores on the post-test. Correlation coefficients were computed for the microcomputer simulation group in the same manner as the comparison group. Only the first lesson achievement score was found to be significantly related to the post-test score for the microcomputer treatment group. Therefore, the hypothesis was rejected.

A third hypothesis relating to objective three involved a test to determine if significant differences existed in the paired correlation coefficients between treatment groups. A $\underline{Z}$ transformation procedure was used to ascertain if the correlation coefficients for each independent student characteristic and posttest achievement scores differed significantly between treatment groups. The results are presented in Table 5. No significant differences were identified and the hypothesis was not rejected.

Table 5: Test for Significant Differences Between Paired Student Characteristic Correlation Coefficients in Each Treatment Group

Characteristic	Transformation Z	Two tailed test Probability
Academic rank	1.73	0.084
Achievement test score	0.00	1.000
Grade level	0.35	0.726
Microcomputer experience	1.94	0.052
Farm experience	0.78	0.424
Soil management experience	1.67	0.090
Gender	0.30	0.764

*No comparisons were significantly different at the .05 level.

A fourth hypothesis was developed to ascertain if the treatment or any of the student characteristics could account for a significant portion of the variance associated with the post-test achievement scores. The underlying hypothesis was tested using a stepwise regression procedure at the .05 level of significance. Results of the stepwise regression procedure are reported in Table 6.

Four characteristics were found to be statistically significant in explaining the variance associated with the post-test achievement test scores. Student scores on the first lesson achievement test accounted for 38.96% of the variance, while farm experience, soil management experience,

and the gender of the student collectively accounted for 7.5% of the variance in the post-test achievement scores. Therefore, the hypothesis was rejected. Student characteristics of academic rank, microcomputer experience, soil management experience, grade level, and the treatment were not found to be statistically significant in explaining the variance associated with post-test achievement scores.

Table 6: Summary of the Stepwise Regression Procedure for Post-Test Achievement Scores

Characteristic	Step entered	Partial R^2	F	p > F
First lesson achievement test score	1	0.3896	74.6624	0.0001
Farm experience	2	0.0328	6.5797	0.0116
Soil management experience	3	0.0212	4.3790	0.0386
Gender	4	0.0206	4.3795	0.0386

CONCLUSIONS

Conclusions and recommendations resulting from this study may be generalized to the population of vocational agriculture classes and students in Missouri from which the sample was drawn. However, these recommendations are limited to the specific microcomputer program and teaching strategy which were used as a part of this study.

1. After equalizing the treatment groups' pre-experiment achievement test scores, adjusted post-test achievement mean scores were not found to be significantly different for the two treatment groups. Therefore, no apparent advantage or disadvantage in student achievement was identified for students who utilized the microcomputer simulation in the instructional process.

2. For the comparison group, relationships between student characteristics and the post-test achievement score indicated that students with higher academic rank, higher first lesson achievement scores, and microcomputer experience generally had higher scores on the post-test. Two other trends were observed. Students with farm experience generally had lower post-test achievement scores. Also, male students generally produced lower scores than female students on the post-test.

In the microcomputer treatment group, the first lesson achievement score was again found to be positively related to post-test achievement scores of student participants. However, other characteristics and variables examined were not similarly related.

3. The first lesson achievement test score variable explained approximately 40% of the variance associated with the post-test while farm

experience, soil management experience, and gender of the student explained only 7.55% of the variance, collectively. Other variables and characteristics not examined as part of this study apparently accounted for over half of the variability associated with post-test scores.

RECOMMENDATIONS

1. The results of the study revealed no positive or adverse effects on student achievement when incorporating a microcomputer simulation experience in teaching secondary vocational agriculture students. This observation suggests that vocational agriculture teachers could use a similar microcomputer program to replace regular instruction or to provide remedial or advanced instruction without adversely affecting student achievement.

2. The post-test achievement mean score for the microcomputer group was slightly higher than the comparison group. This directional movement may indicate that student achievement may be enhanced through extended exposure to microcomputers. Future studies should be conducted to assess the effectiveness of exposure from repeated and continuous microcomputer assisted instructional strategies.

3. Other aspects which future studies should address are: a) measuring the amount of information being transmitted to the student for each teaching strategy during the same time period, b) assessing differences in student retention between the two treatment groups over an extended period, and c) measuring and comparing cost factors for each teaching strategy.

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EVALUATION OF A STATEWIDE PILOT PROJECT TO INTEGRATE AN ONLINE AGRICULTURAL INFORMATION NETWORK INTO THE CLASSROOM

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INTRODUCTION

During the past decade microcomputers have become cost-efficient in farm management activities and in small business usage. This rapid adoption of computer technology by top agricultural producers and their supporting businesses mandates the improvement of the agriculture teacher's capability to both keep pace with the innovators and to be a change agent in helping the early adopters with the necessary education and support in using the new technology. In addition, adults and day school students need to learn by means of the new media if they are to be prepared for their entry into the modern world of agriculture.

Literature indicates that the future will involve increased usage of microcomputers to meet the needs of the agricultural industry. During the past 10 years, rapid development of microcomputer hardware has occurred. According to Dobbins and Suter (1981), the computer may have the same potential impact on agricultural technology as that of the tractor of the 1930's. There has also been a dramatic increase in computer use in the classroom. The role of the computer in education will continue to increase as the cost of computers declines and as educational software is developed and refined (Broussand, 1981).

Hudson (1983) conducted a study of vocational agriculture instructors in Virginia and of the competencies needed to utilize microcomputers in their work. He found that competencies related to actual software and hardware usage were more likely to be considered highly important than those related to programming. Although few other studies have addressed the competencies and skills needed by vocational agriculture instructors, it is widely accepted that instruction in the use of computer technology is needed in preservice and inservice agricultural education programs (Neason & Miller, 1983). Henderson (1985) recommends that:

> Preservice and inservice programs in agricultural education should concentrate on how to integrate microcomputer technology into vocational agriculture programs, rather than how to operate specific pieces of equipment. Identifying instructional goals and objectives for microcomputer use should help instructors to plan and implement effective programs. (p. 10)

Cantrell and Byler (1983) recommended that teacher educators assume a more active role in providing agricultural educators with computer training opportunities. They found the primary use of the computer by agricultural teachers and extension agents in Mississippi to be that of information storage and retrieval. Miller and Kotrlik (1986) concluded that computers in vocational agriculture are used more for instructional management than for tutorial or direct instructional purposes. Sutphin (1984) indicated that applications software programs for word processing, recordkeeping, and database management were used most frequently by vocational agriculture teachers in New York. Teachers also indicated that the ability to use Computer Assisted Instruction programs was important but, in practice, seldom used.

Eigmy and Fuller (1980) indicated that major computer applications for agriculture should include record management and accounting via data management and electronic spreadsheet programs. Camp and Heath (1984) extensively reviewed the potential uses of microcomputers for vocational agricultural SOEP recordkeeping. The authors recommended that students learn recordkeeping practices and then learn to maintain their SOEP records on the microcomputer by using data management programs and commercial spreadsheets.

In order to succeed, given today's world market conditions, American farmers must do more than merely produce. They must learn the art and science of cost accounting, price forecasting, cash flow management, futures marketing, production planning, grain and livestock hedging, etc. Such analyses require access to vast arrays of accurate and up-to-date information.

The contemporary American farmer uses modern computing and telecommunications equipment to access and analyze these information resources. On the American farm, the microcomputer is becoming as essential as the combine, and a subscription to a computerized agriculture information service is as important as receiving the Prairie Farmer magazine.

The National Future Farmers of America (FFA) organization, in conjunction with AgriData Resources, Incorporated, have designed and developed AgEd Network. This network combines the real, up-to-date information of AgriData Network with specially designed agricultural education courseware. AgEd Network is a powerful online educational network that can be used to teach the complex world of agriculture to America's future farmers -- our secondary agricultural education students.

Essentially, AgEd Network is designed to assist the agriculture educator emphasize farm business management skills through the use of the computer. It is a dial-up, interactive information and communication service. Vocational agriculture teachers connect a classroom microcomputer to the AgriData mainframe computers via a toll-free telephone line. By doing so, they gain access to:

* up-to-the-minute agriculture news, market, and weather information,
* farming strategies from several advisory services,
* the latest technological information,
* details on crop and herd management
* over 600 online curriculum lessons that cover virtually every aspect of farm management,
* software reviews of tested CAI and CMI agricultural education programs,
* an idea and information exchange for teachers and students,
* National and State FFA information resources, and
* inter- and intrastate electronic communications.

Education dissemination research has shown that curriculum changes and advances are made when a few recognized leaders participate in

change and then pass the innovations on to others in their field. The use of computer technology to access current information and to manage resources is rapidly becoming an essential element in production agriculture. Therefore, it is very important that today's agriculture students, who will become tomorrow's farmers, be educated in the use of this technology. In order for students to be provided this education, their teachers must become proficient in applying this new technology to the world of agriculture.

PURPOSE AND OBJECTIVES

Based on the need to strengthen the computer literacy of Indiana vocational agriculture teachers in working with current information technology and the hardware that supports it, a project was funded by the Indiana State Board of Vocational and Technical Education for the time period of June 1, 1985 to June 30, 1986.

The project was designed to develop a pilot network for vocational agriculture teachers in the state using AgriData Network as the system. AgriData Network was used because of its communication package between local, state, and national agencies, and the technical information it provided for the daily use by teachers, day school students, young and adult farmers.

The specific objectives of the project were to:

1. Select 37 Indiana vocational agriculture departments and their instructors to be pilot centers in creating an Indiana Agricultural Education Network.
2. Cooperate with Indiana Vocational Education Services and the AgriData Network's summer teacher training institute to provide advanced computer training and network utilization.
3. Provide equipment to link the Indiana agribusiness consultant staff and the Purdue agricultural education office with the 37 pilot schools.
4. Provide memberships in the AgriData Network and connect times needed to activate the system to the pilot centers and therefore facilitate the use of information sources and curriculum materials for use with day school students, young and adult farmers.
5. Monitor the usage by the participants and provide communication to improve the usage in all possible ways.
6. Utilize the AgriData Network facilities for preservice teaching through the Purdue agricultural education program.
7. Disseminate information to other agriculture departments through inservice meetings and publications.
8. Involve administrators in the pilot centers through monthly reports and other communications to enable them to observe the improved education resulting from the pilot programs.
9. Cooperate with others in efforts to develop statewide computer networks for schools and other community agencies.

The purpose of this research paper will be to report the results of this year-long project and the feasibility and use of the AgriData

Network as a mechanized system for providing vocational agriculture teachers with current technological information which could be used to more effectively teach adults and/or students enrolled in high school vocational agriculture classes.

PROCEDURES

In order to accomplish the objectives of the project, the project was divided into four phases or periods of emphasis, designed to facilitate successful completion of the project. In the first phase the 37 vocational agriculture departments were identified from a pool of applicants using the following criteria:

1. Interest of the school in participation, both on the part of the teacher(s) and the administration.
2. Commitment to the training session.
3. Teacher's background of experience in teaching, in working with computers, and leadership qualities that would enhance passing experience along to other teachers in the area.
4. Availability or purchase of the needed hardware for the pilot project.
5. Professional interests of the teacher(s).
6. Willingness to train other teachers in local geographical area.

Also during this phase, the state agribusiness, FFA Leadership Center, and Purdue agricultural education offices were equipped with the necessary hardware to participate actively in the pilot project. The selection of the schools and the teachers to constitute the pilot project was done with the assistance of the cooperating agencies.

In order to participate in the project, each school district was required to provide its vo ag program with access to a microcomputer or video terminal, a printer, a telephone modem, and a telephone line to connect the computer hardware and the AgriData Network system together through a toll free number. During the first year of operation, a school's only contribution was to provide the computer hardware and access to a telephone line. After the first year, each school district would have to assess the value of the system, and begin paying the basic user fee and connect time charges. During the first year of operation, if a teacher used the system beyond the one hour per month connect time charge, the school district was billed for the additional user time.

The second phase of the project, intensive training institute, was utilized to prepare the teachers for their participation in the project. Several agencies combined their resources to provide teachers with the opportunity to take part in the first wave of training in the AgriData Network. These agencies were the Agribusiness Education Division of the Indiana Department of Education, the Indiana Consortium for Computer and High Technology Education, the Indiana State Board of Vocational and Technical Education, the Vocational Education Section of Purdue University, and Vocational Education Services (VES) of Indiana University.

The Consortium funded VES to provide a training institute for preparing the 37 vo ag teachers to use the AgriData Network. The training lasted three days (30 contact hours) and was held at the VES computer lab in Bloomington, Indiana. Teachers who attended received a stipend of $96.00 to help defray their travel and lodging expenses. It is important to note that institute participants were given much practice time on the system and were required to pass a performance test at each step of their training. In addition, a final performance test was given to provide participants an opportunity to demonstrate that they can access and use each component of the AgriData Network system. Those teachers who successfully completed the training session were then eligible to participate in the third facet of the project.

During the third phase of the pilot program the schools were encouraged to utilize the facilities of the AgriData Network to train day school students, young and adult farmers in using information data bases, electronic mail, and curriculum materials. Also during this phase of the pilot program, the participating schools were provided memberships in the AgriData Network and connect time reimbursement to enable them to properly use the technology.

The state agribusiness and Purdue agricultural education offices used the AgriData Network connections for preservice and inservice training activities as well as communicating with local, state, and national agencies. Also during this phase of the project, the pilot schools provided inservice to nearby teachers with interest in how the system functions and how the system is utilized in the pilot schools's vocational agriculture programs.

The fourth phase of the project was the evaluation. A final report was prepared for the Indiana State Board of Vocational and Technical Education.

The population of this study consisted of the 37 schools with vocational agriculture programs who were selected to participate in the statewide AgriData Network project. All 37 schools/teachers participated in the three day workshop held from July 24-26, 1985. During the workshop, actual hands-on experience using the AgriData Network system was provided.

As soon as each school had its computer hardware and software packages located in the respective vocational agriculture department, it was connected to the AgriData Network. Monthly usage by each school/teacher was monitored by monthly reports from AgriData.

With the assistance of personnel from AgriData Network, Vocational Education Services, state consultant staff, and the university agricultural education staff, a telephone survey questionnaire was developed. It was decided by the panel of experts that a telephone survey would be the best method of gathering data from the 37 schools/teachers. Content validity was established by the panel of experts. The 23-item questionnaire was designed to allow ample feedback from each teacher as to his/her reaction to using the AgriData Network.

On May 29, 1986 the project staff gathered at the Vocational Education Services offices to conduct the telephone survey. It took approximately 15 minutes to conduct each survey.

Due to the nature of the telephone survey questionnaire, descriptive statistics were used to analyze and summarize the data. Open-ended questions from the interview were synthesized and listed.

RESULTS

Of the 37 schools/vocational agriculture teachers that were involved in the project, only 32 were connected and using the AgriData Network at the time of the phone survey. The remaining five were not connected due to equipment problems (3), personnel problems (1), and room problems because of phone lines (1). The majority of the schools (75%) were using Apple IIe hardware with two disk drives and a dot matrix printer. Fifty-six percent of the vocational agriculture teachers had the equipment located in their offices while only 16% had equipment in their classrooms. The remaining 28% had their equipment located in other parts of the school.

Seventeen teachers reported having internal modems on their computers and 15 had external modems. In terms of baud rate used, 9 were using 300 baud with an internal modem, 12 were using 300 baud with an external modem, 8 were using 1200 baud with an internal modem, and 3 were using 1200 baud with an external modem.

Sixty-six percent of the teachers indicated they accessed the AgriData Network on a weekly basis, 16% accessed the AgriData Network on a daily basis, 16% on a monthly basis, and 3% on a random basis. Of the 32 teachers using the system, 28 (88%) reported using the AgriData Network in conjunction with regular agriculture classes. The remaining 4 (12%) were connected but not using the system in class.

Table 1 reveals the sources of funding for computer supplies (diskettes, printer ribbon, printer paper, etc.) used with the AgriData Network. Although some teachers reported more than one source, the two major sources were from the school's general fund and the regular agribusiness departmental fund.

(Insert Table 1)

Although the project paid for one hour of free connect time per month to each user, 23 of the teachers had funds set aside for going beyond the allocated free time. Table 2 indicates the sources of funding for extra connect (access) time.

(Insert Table 2)

Table 3 identifies the various subsystems of the AgriData Network and the amount of use each received. The most frequently used subsystem was the AgEd Network lessons and FFA news.

(Insert Table 3)

Eighty-eight percent of the teachers specifically said they were integrating the AgriData Network into their curriculum. This was done by adding real data to their existing lesson plans, upgrading and modifying lesson plans, and by taking information from the AgriData Network to develop new lessons. Several teachers also mentioned that they used it in their lower grade levels to spark students' interest in the more advanced vocational agriculture classes (Table 4).

(Insert Table 4)

Table 5 indicates the specific units or course topics in which the AgriData Network was used. Market reports and specific lessons on farm management and recordkeeping topped the list as information the teachers accessed for their specific classes.

(Insert Table 5)

When asked if the AgriData Network was used for purposes other than preparing for the regular agriculture classes, all 32 teachers indicated that the system was used for either their adult or young farmer program. Some of the teachers reported using the system in more than one of the categories described in Table 6.

(Insert Table 6)

The teachers were asked in which technical areas they needed help in using the AgriData Network. Even though the majority of the 32 teachers had been using the AgriData Network for almost a year, they still indicated a need for a follow-up workshop. Table 7 summarizes their need in five major areas. The three most important were the need for an overall refresher workshop to review how to access each of the subsystems of the AgriData Network, specific directions for downloading information onto a diskette, and how to integrate more of the information from the AgriData Network into the classroom.

(Insert Table 7)

The teachers were also asked their opinions of the usefulness of the AgriData Network in the following three areas: How is the system most useful to you?; How is the system useful in teaching agriculture?; and Is there information you would like to see added to the system? Table 8 provides an assessment of the teachers' responses to the three questions.

(Insert Table 8)

According to the majority (63%) of the teachers using AgriData Network, the greatest strength of using the system is that it provides current agricultural information. A variety of weaknesses were given concerning the use of AgriData Network; however, there wasn't one that seemed to rank significantly higher than the others (Table 9).

(Insert Table 9)

Twenty-one (66%) of the teachers indicated that the system was having an impact on student learning as shown in Table 10. The majority of the teachers felt that AgriData Network increased the interest and motivation of their students.

(Insert Table 10)

CONCLUSIONS AND/OR RECOMMENDATIONS

From the information gathered on the telephone survey and the teachers' comments to the open-ended questions, it appears that indeed teachers feel an online agricultural information network, specifically the AgriData Network, adds a new dimension to the teaching of vocational agriculture. The teachers agreed that the system provides current up-to-date information, and brings into the classroom additional information that they would not normally see or know exists. Although the project was funded for only one year, 23 of the 32 participants were continuing their membership to AgriData Network.

Based upon the recommendations of the participating teachers, a two-day workshop was held at the end of the year-long project. Each participant was asked to bring his/her computer, modem, etc. All agreed that they felt more comfortable using their own equipment and would have preferred to bring it to the earlier workshop. It should also be mentioned that some of the teachers did not have their equipment at the beginning of the project, and for some it was several months after the first workshop before the equipment arrived at their school. Thus, many forgot what they had learned at the first workshop.

It is highly recommended that before a project of this nature takes place, specific criteria must be met by each participating school/vocational agriculture teacher. Specifically, they should have all the necessary computer supplies and equipment (computer, printer, software package, modem, and phone line) in place before the project begins. Those participating teachers should also be required to bring their computer and other equipment to the workshop for training purposes. No matter what is said, there is still a difference in learning and achievement when you get to work on your own equipment.

Currently, several states have asked for a copy of this project in order to begin a similar project in their state. It is the hope of these researchers that the information provided from this state-funded project will help other states avoid unnecessary problems which were encountered and inspire other states to pursue a project similar to this in their state.

Table 1

Sources of Funding For Computing Supplies
(N = 32)

Funding Source*	n	%
General funds	14	45
Agribusiness funds	14	45
FFA funds	4	13
Adult education funds	3	9
Computer funds	1	3
Library funds	1	3

Note: * A program may have more than one source of funding.

Table 2

Sources of Funding Extra Access Time
(N = 23*)

Funding Source**	n	%
General funds	15	65
Agribusiness funds	7	31
FFA funds	5	22
State vocational funds	2	9
Personal funds	2	9
Special funds	1	4
Capital equipment funds	1	4

Notes: * Twenty-three programs set aside funds for extra access time to the AgriData Network system beyond the access time subsidized by the project.
** A program may have more than one source of funding.

Table 3

AgriData Subsystems Accessed
(N = 32)

AgriData Network Subsystem Descriptors	n*	%	Frequency of Use** one time n	intermittently n	regularly n
AgriData -- agricultural information and computing network					
AgriScan	21	66	0	15	6
Price	13	41	1	11	1
StarGram	11	34	4	7	0
Personal File	5	16	1	4	0
MCI Mail	4	13	3	1	0
AgEd Network -- educational network					
Lessons	27	84	1	18	8
FFA News	27	84	3	18	6
FFA Catalog	18	56	2	15	1
Access	9	28	2	7	0

Notes: * Most individuals have used more than one subsystem.
** Frequency of use definitions:
one time -- used one time, usually "to try it out"
intermittently -- 2 to 5 times, no discernible pattern of use
regularly -- 6 or more times, discernible pattern of use

Legend:
- AgriScan -- business information service including market news and reports, weather information, etc.
- Price -- provides assistance in the purchase of agricultural products
- StarGram -- a mail service to send and receive mail electronically
- Personal file -- a filing system for storing copies of documents sent to and received from other network users
- MCI Mail -- a worldwide paper mail and telex delivery service
- Lessons -- agricultural lessons for use by vocational agriculture teachers
- FFA News -- special news stories provided by the FFA news service as well as AgEd Today, a daily news commentary with issues for discussion
- FFA Catalog -- an electronic catalog to order items from the FFA organization
- Access -- official reviews of classroom-tested agricultural software

Table 4

Integration of AgriData Network Into the Curriculum
(N = 28)*

Method/Use	n	%
Add new information to existing materials	19	59
Upgrade/modify/supplement existing materials	17	53
Develop new programs and lessons	7	22

* Note: 28 of the 32 (88%) system users indicated that they had integrated information from the network into their curriculum. Some individuals used the network in more than one way.

Table 5

Units/Classes in Which AgriData Network is Used
(N = 28)*

Unit/Class Topic	n**	%
Farm Management	22	79
Production	12	43
Marketing	8	29
Livestock	3	11
Agricultural Economics	3	11
Adult Extension	3	11

Notes: * 28 of the system users indicated that they had used the system in conjunction with one or more classes.
** 12 of the teachers used the network in conjunction with one class, 9 with two classes, and 7 with three classes.

Table 6

Uses Of The Network Other Than For Planning And Preparing Regular Agriculture Courses
(N = 32)*

Types of Use	n	%
Adults/Young Farmers Groups	32	100
Personal use	14	44
pricing/purchasing (n=4)		
markets/futures (n=10)		
Students (individual projects)	13	41
Teachers--Other Classes	11	34
other agriculture (n=4)		
government (n=3)		
science (n=2)		
English (n=1)		
math (n=1)		
4H/Pre-vocational Courses	6	19

Note: * Some of the teachers reported using the system in more than one of the categories described.

Table 7

Areas In Which Technical Assistance Is Needed In Order To Further Use The AgriData Network
(N = 32)*

Topical Area	n	%
Refresher/review session(s)	17	53
Transfer data from system to microcomputer disk	14	44
Ideas for integrating system into classroom	12	38
More familiarity with hardware	8	25
More familiarity with software	6	19

Note: * Some of the teachers reported using the system in more than one of the topical areas described.

Table 8

An Assessment Of The Usefulness Of The AgriData Network For Agriculture Teachers
(N = 32)

Questions/Response Categories	n	%
How is the system most useful to you?		
Easy access to current, up to date information.	18	56
Decreases course preparation time.	12	36
Adds credibility to my courses.	2	8
How is the system useful in teaching agriculture?		
Current information adds credibility.	15	48
Helps understanding of markets and price information.	10	32
Motivates students.	7	20
Is there information you would like to see added to system?		
More lessons in areas other than management and production.	15	47
Some reports are dated and should be more current.	5	17
Improved graphics/charts for market data.	4	12
Development of items for quizzes and tests.	4	12
Agriculture career information.	4	12

Table 9

Greatest Strength/Weakness Of The AgriData Network System
(N = 32)

Strength/Weakness Descriptors	n	%
Greatest Strength		
Provides current agriculture information.	20	63
Easy to access and use the system.	5	15
A system with a broad and complete information base.	5	15
Inclusion of lessons and other information for agriculture educators.	2	7
Greatest Weakness		
Costs--expensive to use the system.	11	33
Difficulty in initially setting up hardware and software.	9	27
No weakness in the system.	7	23
Need to expand the topics covered in the lesson plans.	5	17

Table 10

AgriData Network System Impact On Student Learning
(N = 26)*

Type of Impact	n	%
Increases the interest and motivation of students.	21	66
Provides real world impact in class.	12	38
Introduces students to the use of high technology.	3	9

Note: * 26 of the 32 (81%) system users indicated the system is having an impact on student learning. Some individuals indicated more than one impact area.

Table 11

Familiarity With Computer Applications
(N = 37)

Application/Use	N*		1**		2***	
	n	%	n	%	n	%
Word processing	10	27	13	35	14	38
Computer-assisted instruction	11	30	16	43	10	27
Computer-managed instruction	25	68	10	27	2	5
Administrative tasks	14	38	15	41	8	22
Design tests/assignments using utilities	15	41	9	24	13	35
Programming to adapt software	22	59	13	35	2	5
Programming to design software	25	68	10	27	2	5
As an information source	17	46	13	35	7	19

Notes: * N = not familiar with the application
** 1 = familiar with the application but do not use
*** 2 = using the application in work

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REACTION PAPER

Title of Paper: Evaluation of a Statewide Pilot Project to Integrate an Online Agricultural Information Network Into the Classroom.

Authors: Jerry L. Peters and Jim Pershing

Reactor: Roy D. Dillon
University of Nebraska-Lincoln

This was basically a demonstration project with descriptive data and information to evaluate the project. The conclusions support the need for the thorough planning that went into the project.

The results indicated there were different management systems used by teachers in implementing the local data utilization system. As a pilot demonstration, the results point up the procedures which could be used as practiced, and procedures which should be changed.

I would have liked to have seen a more precise measure of student achievement. Logically, such local "grass roots" research could be conducted by the individual teachers. Another next step would be to study "how" the AgriData Network System increased the interest and motivation of students. More specifically, in what ways did the teachers use the single terminal to increase student learning?

REACTION PAPER

Title of Paper: Computer Skills Needed by Secondary Agribusiness Students

Authors: Janet L. Henderson & Michael E. Newman

Reactor: Roy D. Dillon
University of Nebraska-Lincoln

The computers in agriculture research area is being actively researched across the U.S. This study should add to that research base of knowledge.

The rationale for and literature review both establish a sound framework for the procedures selected. The design, while limited to a select group, was well planned and fits the study. The ten computer skills selected to be rated seemed mutually exclusive, and the content validity and reliability procedures used were well explained.

The percentage of usable returns from employers was a concern. If a random sample of the missing 38% would have been studied, the inferences would have a stronger basis, providing that no differences were found between the original sample and the non-respondent sample.

The conclusions indicate that teachers are "out in front" of the apparent need as perceived by employers. I agree with the recommendation that further research needs to be done in other places to determine whether the trend found in this study exists elsewhere. Education should be "out in front", as this study points out.

REACTION PAPER

Title of Paper: Evaluation of a Microcomputer Simulation Teaching Strategy

Authors: Michael J. McCaskey, Robert J. Birkenholz, and Bob R. Stewart

Reactor: Roy D. Dillon
University of Nebraska-Lincoln

As teaching strategies are researched, more work of this type is needed to demonstrate if newly introduced equipment such as the computer makes any difference (good or bad) in what or how students learn.

Apparently, educators across the U.S. believe the computer has "some basis" for use, else why would there be so many in the schools?

This research report carefully explains the research design. The researchers were careful to allow for pre-knowledge via the covariance of post test achievement. The statistical tests chosen for testing each H^{o} were appropriate. I was pleased to see the organization of the software content explained, and that a panel was used to content and construct validity of the instrumentation. The pilot study further strengthens the design.

The conclusions presented were what many educators would have expected, based on previous research with other types of teaching aids equipment, ie., 35 mm slide-tape programming, 8 mm film loop programs. The recommendations strike a positive note, indicating that this research proves the computer is still another teaching tool at the disposal of the educator. Another recommendation that could be made would be for longitudinal studies.

THE TEACHING PERFORMANCE OF GRADUATES OF TEACHER EDUCATION PROGRAMS IN VOCATIONAL AND TECHNICAL EDUCATION AND THEIR DECISION TO TEACH

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INTRODUCTION

The issue of teacher competence has recently received much attention from those inside and outside the teaching profession. Concern has been voiced for the abilities of those who now teach and for those who aspire to teach at an increasing rate by both educators and concerned citizens. It seems that one need only peruse any newspaper or educational journal to see evidence of the current movement toward "excellence in education."

The recent concern is not without precedent. Whyte, in his 1956 publication The Organization Man, related the concerns of that period for prospective high school teachers:

> It is now well evident that a large proportion of the younger people who will one day be in charge of our secondary system are precisely those with the least aptitude for education of all Americans attending college. (p. 83)

The Miseducation of American Teachers by Koerner in 1963 issued a scathing indictment of teacher education. Programs to improve teacher education were implemented during this period on the assumption that improving teacher quality would improve the quality of elementary and secondary education. The National Defense Education Act serves as an example of the public support and concern of that period over the issue.

The decade of the 1970's focused on selecting the most qualified teacher candidates from an increasing supply of college graduates. Schlechty and Vance (1983) suggested that the apparent oversupply of college-educated teacher candidates who were willing to teach made teaching as a profession a selective occupation, since schools could choose from among the candidates. They posit that solving the teacher shortage allowed the education profession to address the issues of teacher quality, perhaps with much more vigor. Thus, the focus moved from concerns over finding enough qualified teachers to selecting the best from among an increasing supply of teacher candidates.

Evidence, however, suggests that historically teachers have not been drawn from that segment of the population with the greatest aptitude for academic ability. Studies of teachers from the 1940's, 1950's and 1960's consistently have shown that students preparing to be teachers were less academically able than students preparing to enter other professions (Blum, 1947; Burnett and MacMinn, 1966; Mitzel and Dubnick, 1961). Recent attention to this concern has provided the profession with studies such as by Weaver (1979) and Vance and Schlechty (1982). Both indicated that recent graduates of teacher education programs were drawn from the least academically able college students. Studies have also indicated that of

those who enter teaching, those who remain in the profession are less academically able than those who do not continue to teach (Schlechty and Vance, 1981).

Critics of education and teacher education have interpreted these findings as evidence that teacher quality is less than desirable, while defenders of the quality of teachers have questioned the assumption that academic ability is an accurate and dependable indicator of teacher success. Researchers such as Ducharme (1970), Greaves (1982), and Ferguson (1977) have found, however, that a positive relationship does exist between academic ability and teacher performance.

Vocational education has experienced periodic shortages of qualified teaches in specific areas in recent years. The Vocational Education Act of 1963 and its subsequent amendments brought about increased growth in vocational education programs through the decade of the 1970's. The increased demand for vocational teachers was further complicated by the ability of business and industry to compete for the best vocational teacher education graduates with comparable salaries and perceived better working conditions.

In light of the recent concern for the abilities of teachers in general, the abilities of vocational teachers are also in question. Are the most talented students seeking or being recruited into the teaching profession, or do the best students elect to pursue other career opportunities? If a disproportionate share of teachers is being drawn from the less qualified of college students as the National Commission on Excellence in Education (1983) suggests, then the speculation is easily made that if the quality of vocational teachers is inadequate, the quality of vocational programs is also less than adequate.

A recent study of graduates of the Agricultural Education program from a five year period at another large mid-western university indicated that on measures of academic ability and teaching performance, agricultural education graduates did not differ significantly from graduates in other agriculture majors, from graduates in other secondary education majors, or from university graduates in general (Wardlow, 1984). When those graduates who entered teaching were compared with those who did not enter teaching, agricultural education graduates who taught were found to have earned higher overall grades while in college and to have earned higher grades in both their teaching methods courses and their student teaching experiences (Wardlow, 1986).

PURPOSE AND OBJECTIVES

Knowledge of the teaching abilities of entering teachers would aid the profession in making decisions regarding the recruitment and retention of teachers. The purpose of this study was, therefore, to describe those graduates of the Department of Vocational and Technical Education at the University of Minnesota who were in programs leading to teacher licensure on measures of teaching ability. The specific objectives were as follows:

1. To describe graduates of vocational and technical teacher education programs on supervisor ratings of their performance during their student teaching experience.

2. To describe graduates of the College of Education who were in teacher licensure programs on supervisor ratings of their student teaching performance.

3. To determine if significant differences existed between graduates of all teacher education programs and graduates of vocational and technical teacher education programs on supervisor ratings of their student teaching performances.

4. To determine if significant differences existed between vocational and technical teacher education graduates who entered teaching and those who did not enter teaching on supervisor ratings of their student teaching performances.

PROCEDURES

In preparation for the 1984 review of programs at the University of Minnesota College of Education by the National Council for the Accreditation of Teacher Education (NCATE), the College prepared a program to evaluate its graduates. A part of this project included an evaluation of student teaching performances by university student teacher supervisors. A questionnaire was produced to determine student teachers' abilities in the generic teaching skill areas of planning, instructing, diagnosing, and managing the classroom.

The questionnaire was produced and tested by the College of Education Career Development Office research staff. It included 50 performance items, each of a five-point Likert-type design with "1" being the least desirable performance level and "5" being the most desirable performance level. An alternate response choice, "no opportunity to observe" was included on each item.

A stratified random sample of 477 College of Education student teachers who had taught between the Winter of 1982 and the Spring of 1983 was drawn and the questionnaire was administered to the university staff who had supervised them. Thirty-eight supervisors representing 465 of the graduates responded for a 97 percent response rate. Stratification was done by majors to allow for further analysis between these areas. For this study, the group of all-College graduates for which supervisor ratings were collected was considered the "accessible" population in itself. Graduates of programs in Vocational and Technical Education who were among the respondents were identified and a random sample of that group was drawn using Cochran's formula for determining sample size based on an alpha level set a priori at .05. Fifty-nine Vocational and Technical Education graduates represented this sample.

The data for the all-College sample were summarized in the form of means for each item by the College of Education Career Development Office and are presented for comparison. The data for Vocational and Technical Education

graduates were summarized in the form of means and standard deviations. Since the Vocational and Technical Education sample was actually a sub-set of the population, 95 percent confidence intervals were constructed around the sample means as an appropriate statistical procedure by which to make comparisons. The use of confidence intervals allowed quantifying the degree of confidence to which sample means were actually representative of the population from which they came.

Vocational and Technical Education graduates were identified by their decision to enter teaching as a career choice based on their decision between the completion of their programs and before the Summer of 1985. The ratings of those Vocational and Technical Education graduates who entered teaching were compared with those who did not enter teaching using t-tests to determine if significant differences existed between the groups. Because the expected cell sizes were small, the alpha level was set a priori at the somewhat relaxed level of 0.1 for this particular analysis.

This study utilized a primary data source which was compiled before and was intact at the time of the study. As a result, several circumstances existed which may serve as limitations in making inferences from the results. The accessible population was a sample of all graduates of the College of Education who were in teaching licensure programs. The Vocational and Technical Education sample was a sub-set of the accessible population. While the instrument was developed and tested by a research staff, 38 different university personnel served as raters. This included several different raters for both the Vocational and Technical Education sample and the all-College group. Inter-rater reliability could not be measured, but it was assumed that any variability might as easily exist within groups as between groups. The data indicated that supervisors declined to rate subjects on specific items with varying degrees of frequency. Each of these circumstances should be kept in mind when interpreting the analyses.

RESULTS

Mean values of the supervisor ratings of student teacher performance for the College population and the Vocational and Technical Education sample are presented in Table 1. In determining the mean values for each item, the "0 No opportunity to evaluate" choice was not included in the calculation. This allowed for a true representation of the responses by the mean values. Special note should be given to the number of zeroes on several items in interpreting the results.

The data indicate that for each item, both the College population and the Vocational and Technical Education sample earned mean scores above the 3.5 value. This indicates that both the sample and the population were rated as performing "fair" to "very good" on each item. When 95 percent confidence intervals were constructed around each of the sample means, Vocational and Technical Education graduates earned mean scores which were significantly higher than those earned by the College population on 22 of the 50 items. On none of the 50 items were Vocational and Technical Education graduates rated lower than the college population.

In the planning items in the study, the College population earned scores of 4.0 or higher, "good" to "very good" performance. These were: constructing lesson plans (4.06), planning units of study (4.00), finding instructional materials needed to implement plans (4.11), and taking account of special needs (4.00). However, for the planning portion of the questionnaire, Vocational and Technical Education graduates earned significantly higher ratings for their performances on several items. Those items are listed with the mean score of the Vocational and Technical Education sample followed by the mean score for the College population.

(P 1) Constructing lesson plans. (4.36 - 4.06)
(P 2) Planning units of study. (4.26 - 4.00)
(P 3) Justifying instructional plans. (4.17 - 3.93)
(P 4) Stating explicit goals and objectives. (4.22 - 3.99)
(P 5) Selecting a model of teaching to fit an instructional goal. (4.26 - 3.83)
(P 6) Selecting specific teaching procedures to help students attain objectives. (4.24 - 3.89)
(P10) Designing learning experiences to help all students make the most of their abilities. (4.20 - 3.86)
(P12) Sequencing learning experiences to accomplish objectives. (4.23 - 3.96)

The College population earned a mean rating of 4.0 or greater on one of the 10 items in the instructing portion of the study, while Vocational and Technical Education graduates were rated higher than 4.0 on eight of the 10 items. The population did score in the 3.90 to 3.99 range on six of the items. Vocational and Technical Education graduates were rated significantly higher on the following skills (Vocational and Technical Education means and College means, respectively, follow each item):

(I 1) Using computers in the classroom. (4.54 - 4.11)
(I 3) Using an effective presentation style. (4.17 - 3.91)
(I 4) Asking different kinds of questions to stimulate different kinds of student learning. (4.05 - 3.83)
(I 5) Giving on-going feedback to guide student performance. (4.22 - 3.99).
(I 6) Modifying plans to deal with unexpected events or student responses. (4.19 - 3.94)
(I 7) Demonstrating principles or procedures. (4.30 - 3.91)

Analysis of the managing the classroom performance items revealed that the College population earned a rating above 4.0 on one of the seven items. The Vocational and Technical Education sample earned ratings above 4.0 on six of the seven ratings but rated significantly higher than the population only on their ability to "resolve interpersonal conflicts." For this item the sample earned a mean rating of 4.21 while the population earned a rating of 3.84.

Supervisors rated the College population above 4.0 on three of the 10 skills related to evaluating, while the Vocational and Technical Education sample earned ratings above 4.0 on nine of the skills. The sample was rated significantly higher on the following abilities (Vocational and

Technical Education means and College means, respectively, follow each item):

(E 1) Establishing evaluation criteria. (4.12 - 3.83)
(E 5) Evaluating personal teaching effectiveness. (4.34 - 3.94)
(E 6) Critiquing student performance. (4.16 - 3.91)
(E 7) Using evaluation results to improve instruction. (4.41 - 3.88)
(E10) Evaluating the ethical consequences of one's own actions. (4.42 - 4.02)

Six skill items comprised the diagnosing portion of the questionnaire. The College population earned a mean rating higher than 4.0 on one of these skills, while the Vocational and Technical Education sample earned mean ratings above 4.0 on two of the items. Vocational and Technical Education graduates were found to be rated significantly higher than all College of Education graduates on their ability to "use a variety of methods to determine student status" (3.98 and 3.76, respectively) and their abilities in "identifying non-instructional factors which may be limiting student progress" (4.17 and 3.93, respectively).

The 59 Vocational and Technical Education graduates were identified according to whether they had entered teaching as a profession anytime during the period under study. Those who entered teaching were compared with those who did not enter teaching on each skill item (Table 2). The "no opportunity to evaluate" supervisor response was again deleted from the analyses and t-tests were done to determine if statistically significant differences existed between the groups. An alpha level of 0.1 was set a priori to determine significance.

The analyses revealed significant differences between Vocational and Technical Education graduates who entered teaching and those who did not enter teaching on seven of the 50 items. Differences were not found on the remaining 43 items. While it might be expected that differences would occur on at least five of the items by chance at an alpha level of 0.1, for each of the seven items for which differences were found, the teaching group earned higher ratings than did the non-teachers. When interpreting these results, the number of responses or student ratings should be noted on each item as some are quite small. The teachers were rated higher on the following items. Mean values for the teaching and the non-teaching group, respectively, follow each item.

(P16) Predicting possible effects of instructional plans on students. (3.94 - 3.50)
(I 7) Demonstrating principles or procedures. (4.44 - 4.00)
(M 7) Interacting with students who have special needs. (4.60-4.00)
(E 4) Using criterion-referenced tests. (4.09 - 3.46)
(E 9) Assigning student grades. (4.09 - 3.86)
(D 1) Keeping anecdotal records of atypical student behaviors. (4.00 - 3.00)
(D 2) Using a variety of methods to determine student status. (4.21 - 3.79)

SUMMARY AND CONCLUSIONS

Graduates of the Department of Vocational and Technical Education who sought teacher licensure were rated equal to or better than all graduates of the College of Education who sought licensure. For 22 of the 50 teaching skills performed during student teaching and included in this study, Vocational and Technical Education graduates earned significantly higher ratings than did the all-College group. When vocational and technical teacher education graduates who subsequently entered teaching were compared with those who did not, the teaching group was found to have been rated equal to the non-teaching group on 43 of the 50 skills and higher on seven of the skills.

From this data, collected by the College of Education's process for determining student teacher performance, it can be concluded that graduates of vocational and technical teacher education programs exhibit teaching skills which are comparable with, and in some cases better than, those who are in all other teacher education programs at the University of Minnesota. Further, those Vocational and Technical Education graduates who subsequently enter teaching exhibit teaching skills which are equal to or better than the skills of those who do not teach. One might suggest that supervisors of Vocational and Technical Education graduates utilized different standards on which to rate their students than did other supervisors. However, the argument could be made that those standards were higher as easily as one could argue that the standards were lower.

In light of the recent concern for the quality of graduates of our teacher education programs and for those who enter teaching, the findings of this study should be reviewed by the teaching profession. These data indicate that vocational and technical teacher education graduates are as well prepared to teach, and in some skill areas are prepared significantly better, as their peers in other teacher education programs. Further, the education profession is attracting the best prepared from among these.

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Table 1

Vocational-Technical Education Graduates Compared with All College of Education Graduates on Student Teaching Skills.

0. No opportunity to evaluate.
1. Very poor performance.
2. Poor performance.
3. Fair performance.
4. Good performance.
5. Very good performance.

Skill areas	All college			Vo-tech ed			95% C.I.
	N	$\bar{X}$	no.of zeroes	$\bar{X}$	S.D.	no.of zeroes	around Vo-ed $\bar{X}$
Planning							
1. Constructing lesson plans.	451	4.06	1	4.36	.731	0	4.17 to 4.54 *
2. Planning units of study.	449	4.00	1	4.26	.806	2	4.05 to 4.47 *
3. Justifying instructional plans.	447	3.93	4	4.17	.771	6	3.96 to 4.38 *
4. Stating explicit goals and objectives.	450	3.99	0	4.22	.666	0	4.05 to 4.39 *
5. Selecting a model to fit an instructional goal.	446	3.83	5	4.26	.791	4	4.04 to 4.46 *
6. Selecting specific teaching procedures to help students attain objectives.	451	3.89	1	4.24	.773	1	4.04 to 4.44 *
7. Finding instructional materials needed to implement plans.	447	4.11	5	4.10	.803	1	3.89 to 4.31
8. Selecting instructional materials according to specific criteria (e.g., reading level).	415	3.92	36	3.83	.601	13	3.65 to 4.00
9. Selecting instructional methods that match student developmental needs.	435	3.84	17	3.91	.837	4	3.69 to 4.13
10. Designing learning experiences to help all students make the most of their abilities.	444	3.86	5	4.20	.795	4	3.98 to 4.41 *
11. Taking account of special needs (e.g., handicapped).	341	4.00	111	4.18	.747	15	3.96 to 4.40
12. Sequencing learning activities to accomplish objectives.	447	3.96	3	4.23	.756	3	4.03 to 4.43 *
13. Designing the classroom environment to promote learning.	425	3.99	26	4.19	.848	6	3.96 to 4.42
14. Building motivators into instructional plans (e.g., variety).	452	3.96	0	4.08	.944	0	3.84 to 4.33
15. Evaluating an instructional plan according to explicit standards.	388	3.84	50	3.96	.764	7	3.75 to 4.18
16. Predicting possible effects of instructional plans on students.	417	3.70	33	3.86	.765	16	3.63 to 4.09
17. Preparing outlines for effective oral presentations.	373	3.97	68	4.30	.837	6	4.07 to 4.53

* Significant within a 95% Confidence Interval.

N = 465. The reported N for each item plus the number of zeroes represents the respondents for the item.

n = 59 on each item.

Table 1 continued.

	All college N	All college μ	All college no.of zeroes	Vo-tech ed $\bar{x}$	Vo-tech ed S.D.	Vo-tech ed no.of zeroes	95% C.I. around Vo-ed $\bar{x}$
Instructing							
1. Using computers in the classroom.	71	4.11	374	4.54	.656	48	4.14 to 4.95 *
2. Using audiovisual equipment in the classroom.	350	3.95	102	4.11	.809	5	3.89 to 4.33
3. Using an effective presentation style.	444	3.91	4	4.17	.791	1	3.96 to 4.38 *
4. Asking different kinds of questions to stimulate different kinds of student learning.	448	3.83	4	4.05	.811	0	3.84 to 4.26 *
5. Giving on-going feedback to guide student performance.	446	3.99	5	4.22	.809	5	4.00 to 4.44 *
6. Modifying plans to deal with unexpected events or student responses (e.g., an interest in pursuing a particular topic).	421	3.94	31	4.19	.804	2	3.98 to 4.40 *
7. Demonstrating principles or procedures.	443	3.91	8	4.30	.791	6	4.09 to 4.52 *
8. Explaining how or why something happened.	450	3.91	2	4.05	.804	2	3.84 to 4.26
9. Defining concepts.	443	3.84	8	3.98	.761	2	3.78 to 4.18
10. Improving students questioning and discussion skills.	406	3.68	36	3.84	.703	9	3.64 to 4.04
Managing the classroom.							
1. Providing rewards to motivate students.	428	3.88	22	4.02	.774	4	3.81 to 4.22
2. Encouraging self-direction in students.	441	3.95	11	4.14	.753	1	3.94 to 4.33
3. Dealing with behavior problems during class.	446	3.79	6	3.94	.958	6	3.68 to 4.21
4. Clarifying expectations for student behavior.	446	3.91	6	4.05	.749	4	3.85 to 4.25
5. Holding students responsible for their actions.	439	3.93	12	4.10	.766	7	3.89 to 4.31
6. Resolving interpersonal conflicts.	347	3.84	104	4.21	.644	35	3.94 to 4.47 *
7. Interacting with students who have special needs.	370	4.12	81	4.31	.659	23	4.09 to 4.52
Evaluating.							
1. Establishing evaluation criteria.	415	3.83	34	4.12	.682	9	3.93 to 4.31 *
2. Interpreting standardized achievement tests.	66	3.96	382	4.33	.471	56	3.68 to 4.99
3. Constructing tests to measure student progress.	300	3.98	149	4.07	.640	1	3.90 to 4.23
4. Using criterion-referenced tests.	214	3.91	229	3.86	.681	30	3.61 to 4.11
5. Evaluating personal teaching effectiveness.	449	3.94	2	4.34	.778	1	4.14 to 4.55 *
6. Critiquing student performance (e.g., strengths, areas which need improvement).	432	3.91	20	4.16	.791	10	3.94 to 4.39 *
7. Using evaluation results to improve instruction.	415	3.88	37	4.41	.728	10	3.94 to 4.35 *
8. Reporting information about students to parents.	180	4.12	272	4.31	.821	46	3.84 to 4.77
9. Assigning student grades.	239	4.10	212	4.03	.440	23	3.88 to 4.17
10. Evaluating the ethical considerations of one's own actions.	375	4.02	71	4.42	.759	23	4.16 to 4.67 *
Diagnosing.							
1. Keeping anecdotal records of atypical student behavior.	181	3.86	258	3.75	.901	43	3.29 to 4.21
2. Using a variety of methods to determine student status.	353	3.76	87	3.98	.643	18	3.78 to 4.17 *
3. Integrating information from several sources to determine student needs.	344	3.84	97	3.98	.750	11	3.76 to 4.19
4. Determining student developmental level.	353	3.74	88	3.61	.804	15	3.37 to 3.85
5. Participating in case conferences with staff.	143	4.23	298	4.37	.781	43	3.98 to 4.77
6. Identifying non-instructional factors which may be limiting student progress.	347	3.93	97	4.17	.753	17	3.94 to 4.40 *

* Significant within a 95% Confidence Interval.

Table 2

Vocational-Technical Education Graduates Who Taught Compared with Those Who Did Not Teach on Student Teaching Skills.

0. No opportunity to evaluate.
1. Very poor performance.
2. Poor performance.
3. Fair performance.
4. Good performance.
5. Very good performance.

Skill areas

	Taught			Did not teach				
Planning	n	$\bar{X}$	S.D.	n	$\bar{X}$	S.D.	t-value	2-tail p
1. Constructing lesson plans.	18	4.11	.76	25	4.44	.65	1.526	.131
2. Planning units of study.	17	4.06	.75	25	4.33	.82	1.098	.279
3. Justifying instructional plans.	15	4.07	.70	24	4.17	.87	0.375	.711
4. Stating explicit goals and objectives.	18	4.28	.67	25	4.12	.73	0.726	.521
5. Selecting a model to fit an instructional goal.	17	4.06	.90	25	4.28	.79	0.841	.590
6. Selecting specific teaching procedures to help students attain objectives.	18	4.22	.73	25	4.12	.88	0.402	.692
7. Finding instructional materials needed to implement plans.	18	4.00	.84	25	4.04	.84	0.154	.873
8. Selecting instructional materials according to specific criteria (e.g., reading level).	14	3.71	.47	22	3.82	.66	0.509	.620
9. Selecting instructional methods that match student developmental needs.	16	3.88	.81	23	3.87	.92	0.019	.983
10. Designing learning experiences to help all students make the most of their abilities.	18	4.06	.80	23	4.13	.87	0.283	.775
11. Taking account of special needs (e.g., handicapped).	12	4.00	.95	19	4.00	.67	0.000	1.000
12. Sequencing learning activities to accomplish objectives.	16	4.19	.75	24	4.08	.83	0.404	.691
13. Designing the classroom environment to promote learning.	16	4.25	.86	21	4.10	.94	0.514	.616
14. Building motivators into instructional plans (e.g., variety).	18	4.17	1.04	25	4.04	.98	0.407	.688
15. Evaluating an instructional plan according to explicit standards.	15	3.73	.59	24	3.92	.88	0.710	.511
16. Predicting possible effects of instructional plans on students.	17	3.94	.66	18	3.50	.79	1.794	.078 •
17. Preparing outlines for effective oral presentations.	17	4.18	.64	24	4.38	.92	0.766	.545

• Significant at $\alpha = 0.1$.

N = 59. Responses vary for items as several supervisors indicated "no opportunity to evaluate."

Table 2 continued.

	Taught			Did not teach				
Instructing	n	$\bar{X}$	S.D.	n	$\bar{X}$	S.D.	t-value	2-tail p
1. Using computers in the classroom.	6	4.67	.52	4	4.25	.96	0.904	.604
2. Using audiovisual equipment in the classroom.	18	4.11	.83	25	4.16	.75	0.202	.835
3. Using an effective presentation style.	17	4.06	.83	25	4.20	.82	0.547	.594
4. Asking different kinds of questions to stimulate different kinds of student learning.	18	4.17	.79	25	3.96	.79	0.848	.594
5. Giving on-going feedback to guide student performance.	16	4.31	.70	25	4.12	.97	0.685	.504
6. Modifying plans to deal with unexpected events or student responses (e.g., an interest in pursuing a particular topic).	17	4.35	.70	24	4.04	.87	1.142	.259
7. Demonstrating principles or procedures.	16	4.44	.73	25	4.00	.87	1.676	.098 *
8. Explaining how or why something happened.	18	4.06	.80	25	3.88	.88	0.669	.514
9. Defining concepts.	18	3.89	.68	25	3.92	.91	0.123	.899
10. Improving students questioning and discussion skills.	14	3.86	.66	24	3.67	.76	0.777	.553
Managing the classroom.								
1. Providing rewards to motivate students.	17	4.06	.90	22	3.91	.81	0.545	.595
2. Encouraging self-direction in students.	18	4.17	.79	24	4.00	.78	0.683	.506
3. Dealing with behavior problems during class.	16	4.19	.75	21	3.67	1.15	1.567	.122
4. Clarifying expectations for student behavior.	16	4.13	.72	23	3.87	.87	0.967	.658
5. Holding students responsible for their actions.	17	4.24	.56	24	3.92	.93	1.258	.213
6. Resolving interpersonal conflicts.	9	4.33	.71	7	4.14	.90	0.475	.646
7. Interacting with students who have special needs.	10	4.60	.52	18	4.00	.69	2.405	.022 *
Evaluating.								
1. Establishing evaluation criteria.	14	3.93	.73	22	3.95	.65	0.111	.908
2. Interpreting standardized achievement tests.	(insufficient number of cases for analyses)							
3. Constructing tests to measure student progress.	18	3.83	.62	24	4.13	.61	1.521	.132
4. Using criterion-referenced tests.	11	4.09	.54	13	3.46	.66	2.526	.018 *
5. Evaluating personal teaching effectiveness.	18	4.33	.77	24	4.17	.87	0.647	.528
6. Critiquing student performance (e.g., strengths, areas which need improvement).	16	4.25	.68	22	3.95	.90	1.102	.277
7. Using evaluation results to improve instruction.	17	4.06	.83	24	4.00	.66	0.253	.797
8. Reporting information about students to parents.	7	4.29	.49	4	4.00	1.41	0.502	.632
9. Assigning student grades.	11	4.09	.30	21	3.86	.36	1.844	.072 *
10. Evaluating the ethical considerations of one's own actions.	13	4.46	.66	14	4.14	.95	1.005	.326
Diagnosing.								
1. Keeping anecdotal records of atypical student behavior.	9	4.00	.71	5	3.00	1.00	2.196	.046 *
2. Using a variety of methods to determine student status.	14	4.21	.80	19	3.79	.54	1.827	.074 *
3. Integrating information from several sources to determine student needs.	14	3.86	.77	21	3.81	.60	0.205	.833
4. Determining student developmental level.	13	3.62	.77	19	3.32	.82	1.041	.307
5. Participating in case conferences with staff.	6	4.33	.52	6	4.17	1.17	0.319	.753
6. Identifying non-instructional factors which may be limiting student progress.	14	4.07	.62	18	4.06	.87	0.058	.953

* Significant at $\alpha = 0.1$.

FACTORS ASSOCIATED WITH THE PROBLEM SOLVING ABILITY OF HIGH SCHOOL STUDENTS ENROLLED IN VOCATIONAL HORTICULTURE

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INTRODUCTION

The ability to solve problems is an essential quality for human survival. During recent decades, there has been a growing amount of research and classroom application efforts concerning the development of the problem-solving ability of students. In spite of a continuing interest in learning about problem solving as a cognitive ability and its application in the classroom, the level of problem solving competence of students has been less than satisfactory (Picus, Sachse, & Smith, 1983). Results from the National Assessment of Educational Progress indicate that ". . . while performance in basic skills is improving, students showed uniformly poor performance at the application or problem solving level" (Picus et al., 1983).

Assessment of the problem-solving ability of students enrolled in vocational education courses is also discouraging. Thinking deficiencies have been cited as a major weakness of high school graduates in the workplace (Champaign, 1985). In The Unfinished Agenda: The Role of Vocational Education in the Secondary School, the National Commission on Secondary Vocational Education (1985) proposed that vocational education courses provide instruction in the basic school subjects as well as problem-solving skills. These cognitive skills are recognized as competencies a high school graduate needs to enter and advance in a career (National Academy of Sciences, 1984).

Emphasis on the ability to think and to apply knowledge in a problem-solving manner is certainly not new to vocational agriculture. Rooted in the basic notion of John Dewey's reflective thinking, problem solving as an approach to teaching has been advocated and used in vocational agriculture since the early 1900s. Rosenfeld (1984) contended that the problem-solving orientation of vocational agriculture is ". . . more like the approaches learned in basic engineering and science than those learned in typical vocational training programs." The benefits of using the problem-solving approach in teaching vocational agriculture have been summed up as "helping students learn how to learn and how to transfer (Warmbrod, 1970), which can lead to the development of "intellectual anatomy" in students (Crunkilton, 1984).

Advocacy of the use of problem solving in teaching vocational agriculture has in the past been grounded on two factors, namely, the farm background of students and the supervised farming programs engaged in by students. With agricultural and educational environments much different today than in the past, it has been questioned whether the problem-solving approach is workable. One argument is that the advocacy of the problem-solving approach rests primarily on traditional wisdom without an empirical basis to substantiate its merit (Moore & Moore, 1984).

A fundamental part of the rationale underlying the research reported in this paper is that problem solving is a learnable cognitive ability (de Bono, 1984; Lochhead & Clement, 1979; Whimbey, 1980). Gagne (1985) maintains that "Problem solving is not simply a matter of applying previously learned rules. . . . It is a process that yields new learning." Problem solving is a process that extends beyond knowledge attainment and retention, consequently, a solid knowledge base is an essential contextual element of effective problem solving (Greeno, 1980; McPeck, 1983; Thomas, 1986).

The theory of problem-solving instruction on which this research is based takes into account three important factors: a knowledge base in subject-matter, problem-solving strategies and individual differences of students (Ronning, McCurdy & Ballinger, 1984). Because of the interrelationship between the knowledge in subject matter possessed by problem solvers and their knowledge and skill in the procedures they use to solve problems, achievement and problem-solving ability were treated as two interrelated domains of cognitive outcomes. Specifically, students' level of knowledge was measured by achievement in horticulture. Program variables, such as problem-solving teacher behavior and supervised occupational experience activities, were treated as factors through which problem-solving strategies can be manifest. Academic aptitude, which has been found to be strongly related to problem solving ability (Whimbey, 1984), was used as an index of individual differences of students.

PURPOSE AND OBJECTIVES

Four major research questions were investigated.

1. How can high school students enrolled in vocational horticulture programs be described in terms of their ability to solve problems in technical horticulture?

2. What are the relationships between the problem-solving ability of students and the following independent variables: (a) academic aptitude; (b) extent to which teachers use problem-solving teaching behaviors; (c) degree of students' involvement in supervised occupational experience; (d) degree of students' participation in FFA; (e) grade level of students; and (f) subject matter emphasis of the vocational horticulture program in which students are enrolled?

3. What relationships exist between achievement in horticulture and the independent variables named above?

4. What relationships exist between the set of cognitive performance variables (problem-solving ability and achievement) and the set of independent variables (academic aptitude of students and vocational agriculture program variables)?

PROCEDURES

A descriptive-correlational design was used. A purposive sample of 124 junior and senior high school students was selected from a

population of high school students not identified as special needs students enrolled in vocational horticulture programs in area vocational schools in Ohio. Students in the sample were enrolled in seven area vocational schools that meet the following criteria: the school participated in 1986 in the Ohio Vocational Education Achievement Test Program and the school was located within 100 miles of the campus of The Ohio State University to facilitate the investigator traveling to the school to administer the research instruments.

Achievement in horticulture was measured by the Ohio Horticulture Achievement Test, 1986, administered as a part of the Ohio Vocational Education Test Program. Subparts of the test dealing with plant and soil science were used to describe achievement. For the 266 test items, the K-R 21 internal consistency coefficient is .94. Academic aptitude was measured by scores on the California Short Form Test of Academic Aptitude also administered as a part of the Ohio Vocational Education Test Program. The K-R 21 interval consistency coefficient for the 85-item test is .87.

Problem-solving ability in horticulture was measured by a pencil-and-paper test developed by the researcher. The content-specific test consists of seven problem situations with a series of multiple-choice format questions requiring students to identify the cause of the problem or indicate whether proposed solutions (a) would largely solve the problem; (b) might help reduce the problem; or (c) would not reduce the problem. The Solving Problems in Horticulture Test was developed in consultation with graduate students who are former teachers of horticulture, horticulture majors who have experience in industry and teachers of vocational horticulture who are not in the schools from which the sample was drawn. Content validity of the instrument was assessed by experts in agricultural education and horticulture. The test was field tested with four classes of students and, following revision, with two additional classes of students not included in the sample. The K-R 20 internal consistency coefficient for the 38-item test is .61.

The extent to which teachers use problem-solving teaching behaviors was measured by teachers rating themselves on 21 items that indicate the extent to which they engage students in problem-solving learning experiences. Teachers responded to each item on a 5-point scale ranging from almost never, or never (1) to almost always, or always (5). Teachers scored each student on their degree of involvement in supervised occupational experience programs using an SOE Score Sheet prepared by the researcher. Total possible score on the scale was 40. Test-retest reliability coefficients for the instrument calculated for four teachers ranged from .79 to .95. Students completed a FFA Participation Checklist indicating their degree of participation in local, state and national FFA activities. Teachers validated students' responses on the instrument. The highest possible score on the instrument is 89.

Correlational analyses were used including simple correlations, regression analyses on individual variables and sets of variables, and canonical correlation analysis.

RESULTS

Students demonstrated limited knowledge of horticulture. The distribution of scores on the horticulture achievement test is positively skewed with a mean score of 113, which is 42% of the items correct. One-half of the students correctly answered less than 40% of the items on the achievement test (Table 1).

Table 1

Scores on Horticulture Achievement Test

Score	f	%	Cumulative %
Less than 65	2	1.6	1.6
65-79	12	9.7	11.3
80-94	27	21.8	33.1
95-109	27	21.8	54.8
110-124	17	13.7	68.5
125-139	16	12.9	81.5
140-154	7	5.6	87.1
155-169	7	5.6	92.7
170-184	4	3.2	96.0
185-199	4	3.2	99.2
200-214	0	0.0	99.2
215 or higher	1	0.8	100.0
Total	124	100.0	

Note. Mean = 113.4; Median = 105.5; Mode = 85.0; Std Dev = 32.47; Range = 168.0.

The mean score on the problem-solving ability test is 19, 50% of the highest score that is possible. The near-normal distribution of scores indicates a range of scores from 8 to 30 on the 38-item test (Table 2).

The mean score on the 85-item academic aptitude test is 45, approximately 53% of the items correct. Academic aptitude scores ranged from 13 to 75 (Table 3).

The slightly positively skewed distribution of scores on the supervised occupational experience scale indicates a wide range in degree of involvement with the average degree of involvement being a score of 25, slightly over 60% of the highest score possible on the 40-point scale (Table 4). FFA participation scores indicate a highly positively skewed distribution and a generally low level of participation in FFA activities (Table 5).

Table 2

Scores on Problem-Solving Ability Test

Scores	f	%	Cumulative %
Less than 10	1	0.8	0.8
10-11	2	1.6	2.4
12-13	11	8.9	11.3
14-15	14	11.3	22.6
16-17	18	14.5	37.1
18-19	23	18.5	55.6
20-21	15	12.1	67.7
22-23	17	13.7	81.5
24-25	9	7.3	88.7
26-27	7	5.6	94.4
28-29	6	4.8	99.2
30 or higher	1	0.8	100.0
Total	124	100.0	

Note. Mean = 19.2; Median = 19.0; Mode = 19.0; Std Dev = 4.65; Range = 22.0.

Table 3

Scores on Academic Aptitude Test

Score	f	%	Cumulative %
Less than 20	1	0.8	0.8
20-24	1	0.8	1.6
25-29	8	6.5	8.1
30-34	14	11.3	19.4
35-39	22	17.7	37.1
40-44	22	17.7	54.8
45-49	12	9.7	64.5
50-54	11	8.9	73.4
55-59	17	13.7	87.1
60-64	6	4.8	91.9
65-69	8	6.5	98.4
70-74	1	0.8	99.2
75 or higher	1	0.8	100.0
Total	124	100.0	

Note. Mean = 45.1; Median = 44.0; Mode = 44.0; Std Dev = 12.15; Range = 62.0.

Table 4

Scores on Involvement in Supervised Occupational Experience

Scores	f	%	Cumulative %
Less than 10	1	0.8	0.8
11-13	3	2.4	3.2
14-17	7	5.6	8.9
18-21	24	19.4	28.2
22-25	34	27.4	55.6
26-29	20	16.1	71.8
30-33	16	12.9	84.7
34-37	16	12.9	97.6
38 or higher	3	2.4	100.0
Total	124	100.0	

Note. Mean = 25.4; Median = 25.0; Mode = 22.0; Std Dev = 6.58; Range = 30.0.

Table 5

Scores on FFA Participation Scale

Scores	f	%	Cumulative %
5 or less	49	39.5	39.5
6-10	33	26.6	66.1
11-15	18	14.5	80.6
16-20	12	9.7	90.3
21-25	3	2.4	92.7
26-30	5	4.0	96.8
31-35	3	2.4	99.2
36-40	0	0.0	99.2
41 or higher	1	0.8	100.0
Total	124	100.0	

Note. Mean = 9.4; Median = 7.0; Mode = 2.0; Std Dev = 8.04; Range = 40.0.

Bivariate correlations between variables indicate the following (Table 6):

- the higher students' achievement in horticulture, the higher their ability to solve problems in horticulture (r = .52).

- academic aptitude is positively related both to achievement (r = .59) and problem-solving ability (r = .57).

- the higher the students' involvement in supervised occupational experience programs, the higher their achievement in horticulture (r = .39) and the higher their score on problem-solving ability (r = .29).

- the higher the students' participation in FFA activities, the higher their achievement in horticulture (r = .28); however, level of FFA participation is not related to problem-solving ability.

- the extent to which teachers report that they use problem-solving teaching behaviors is positively related to students' achievement in horticulture (r = .37), but teachers' problem-solving teaching behavior is not correlated with students' ability to solve problems.

Regression analyses indicate that of all the independent variables studied, academic aptitude explains the highest proportion of variance in both problem-solving ability and achievement in horticulture. However, when academic aptitude is held constant, the program variables explain a significant proportion of the variability in both problem-solving ability (Table 7) and achievement in horticulture (Table 8) over and above the proportion of the variability in each dependent variable explained by academic aptitude.

Hierarchical regression analysis of problem-solving ability on the independent variables indicates that, in addition to academic aptitude, two program variables--involvement in supervised occupational experience programs and subject-matter emphasis of the vocational horticulture program--explain significant proportions of the variability in problem-solving ability. The higher the degree of involvement in supervised occupational experience, the higher the score on problem solving ability. Enrollment in a horticulture program that emphasizes landscape subject matter, in contrast to greenhouse/floriculture subject matter, is associated with higher levels of problem-solving ability.

Hierarchical regression analysis of achievement in horticulture on the independent variables indicates that, in addition to academic aptitude, three program variables--involvement in supervised occupational experience programs, problem-solving teacher behavior and subject matter emphasis of the vocational horticulture program--explain significant proportions of the variability in achievement in horticulture. Again, higher levels of involvement in supervised occupational experience programs and enrollment in programs with landscape subject matter emphasis are associated with higher levels of achievement in horticulture. Also, the more extensively teachers use problem-solving teaching behaviors, the higher students score on the horticulture achievement test.

Table 6

Correlation Matrix (n = 124)

Variables	Dependent		Independent							
	Y_1	Y_2	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
Problem Solving Ability (Y_1)	1.00									
Achievement (Y_2)	.52**	1.00								
Academic Aptitude (X_1)	.57**	.59**	1.00							
SOE Involvement (X_2)	.29**	.39**	.26*	1.00						
FFA Participation (X_3)	.16	.28*	.18	.33**	1.00					
Problem-Solving Teacher Behavior (X_4)	.11	.37**	.01	.16	.14	1.00				
Greenhouse/Floriculture Program (X_5)[a]	-.13	-.26*	-.06	.06	-.09	-.11	1.00			
Landscape Program (X_6)[a]	.21	.24*	-.05	.02	-.01	.23	-.58**	1.00		
Combination Program (X_7)[a]	-.07	.05	.13	-.09	.11	-.11	-.54**	-.37**	1.00	
Grade Level (X_8)[b]	.08	.21	.20	.16	.20	.12	-.38**	-.09	.52**	1.00

[a]Code: 1 = enrolled in program; 0 = not enrolled in program. [b]Code: 0 = junior; 1 = senior.

*p = .01. **p = .001.

Table 7

Regression of Problem-Solving Ability Scores on Sets of Independent Variables (n = 124)

Variable Set	K_A	K_B	sR^2	F	p
Academic aptitude	5	1	.274	54.07	.0001
Program Variables[a]	1	5	.081	3.20	.01

Note. Overall R^2 = .407; p = .001.

[a]Program variables are SOE involvement, FFA participation, problem-solving teacher behavior, dummy variable for landscape program, and dummy variable for greenhouse/floriculture program.

Table 8

Regression of Achievement Scores on Sets of Independent Variables (n = 124)

Variable Set	K_A	K_B	sR^2	F	p
Academic aptitude	6	1	.247	66.32	.0001
Program variables[a]	1	6	.219	9.80	.0001

Note. Overall R^2 = .568; p = .0001.

[a]Program variables are SOE involvement, FFA participation, problem-solving teacher behavior, grade level, dummy variable for landscape program, and dummy variable for greenhouse/floriculture program.

Canonical correlational analysis confirmed the findings indicated by regression analysis. All the independent variables as a set predict cognitive performance when cognitive performance is defined as a set that includes both problem-solving ability and achievement in horticulture. Academic aptitude is the most important variable in the predictive variables set. Grade level is relatively unimportant to the relationship between the two sets of variables.

CONCLUSIONS AND RECOMMENDATIONS

Academic aptitude of students explains the highest proportion of variance in students' problem-solving ability and achievement in horticulture.

When academic aptitude is held constant, program variables as a group explain a significant additional proportion of the variability both in problem-solving ability and achievement in horticulture.

Vocational horticulture students who exhibit higher levels of problem-solving ability and possess higher levels of achievement in horticulture tend to have higher levels of academic aptitude, are engaged to a greater extent in supervised occupational experience programs, participate to a greater extent in FFA activities, are taught by teachers who report using more problem-solving teacher behaviors and are more likely to be enrolled in vocational horticulture programs that emphasize landscape subject matter.

Three lines of further investigation of problem solving are recommended. First, research is needed to replicate this study with other specialized subject matter areas of vocational agriculture. Additional variables, particularly teachers' knowledge of and ability to use problem-solving teaching strategies, should be included in these comprehensive correlational studies. Second, qualitative research should be conducted to investigate in-depth the problem-solving process focusing both on ill-structured and structured problem solving. Third, comprehensive research is needed to investigate the impact of problem-solving approaches to teaching vocational agriculture. In these comparative studies, the appropriate dependent variable is problem-solving ability.

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LEVELS OF COGNITION OF TESTING AND STUDENT ASSIGNMENTS IN THE COLLEGE OF AGRICULTURE, THE OHIO STATE UNIVERSITY

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INTRODUCTION

Instructors at all educational levels have been concerned with the actual kinds of learning taking place in their classrooms. Faculty in colleges of agriculture are no exception. They teach an enormous amount of subject matter in an area where knowledge is rapidly expanding. Many professors of agriculture concern themselves with what their students learn, but are less concerned with how and at what level of cognition it is being learned.

The types of questions being used to assess learning have been examined in terms of their relationship to student learning. At least ten classification systems were developed in the 1950's and 60's for categorizing questions as to which levels of cognition they were measuring (Ryan, 1973). One of those systems, The Taxonomy of Educational Objectives Handbook I: Cognitive Domain (Bloom, Englehart, Furst, Hill and Krathwohl, 1956) can be used to classify cognitive thought and associated behaviors into six hierarchical levels. A modification of Bloom's taxonomy was used in this study to determine at what levels of cognition test questions and out-of-class assignments occurred in college agricultural courses.

The levels identified in the taxonomy for classifying objectives and questions are based on the type of cognitive processes required to fulfill the objective or answer a particular question (Andre, 1979). The six levels defined in Bloom's taxonomy are: knowledge, comprehension, application, analysis, synthesis, and evaluation. The levels are presented in a hierarchical order, with knowledge being the simplest process and evaluation the most complex. Each level is intended to serve as a pre-requisite skill for the next higher level (e.g., knowledge is required before comprehension can occur; application involves the use of both knowledge and comprehension, etc.).

Even though classification systems are available, very little work has been done to ascertain at what levels of cognition student performance on tests and assignments is occurring in colleges of agriculture. Hence the authors felt it was important to determine how learning was distributed across the levels of cognition. Once this is known, professors can address the more important question of what ought to be. Furthermore, additional inquiry can be pursued to determine under what conditions higher order learning best occurs.

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the cognitive levels of test questions and out-of-class assignments currently being used in the College of Agriculture at The Ohio State University.

This study was designed to answer the following research questions:

1. How can the levels of cognitive behavior represented in student examinations and assignments be measured?

2. To what extent are current testing and assignment practices in the College of Agriculture at The Ohio State University requiring students to perform at each level of cognition?

PROCEDURES

Population and Sample

The population for the study consisted of all faculty members holding a teaching appointment in the College of Agriculture (N=188). A purposeful sample was drawn, with representation from each department within the college (n=22). Professors who were known by the investigators to be good teachers and who were interested in improving their instruction were selected. Sixteen participants completed the requirements of the study.

Design of the Study

This was a descriptive study.

Instrumentation

A method for assessing the cognitive levels of questions used in examinations and student assignments was developed based on Bloom's taxonomy (1956). Through a review of literature in the field and personal consultation with David L. Krathwohl, one of the authors of this taxonomy, the project staff developed a modified version of the taxonomy for use in the study, consisting of four rather than six levels. The four specific levels were:

1. Remembering - involves no more than a recall of information presented to the student;

2. Processing - requires an understanding of the information and its use in a procedural manner;

3. Creating - requires the combination of information in a form that is new to the student;

4. Evaluating - requires the student to use the information in making an independent judgment or evaluation.

Furst (1981) argues that it is necessary to know how the material was originally presented to the student to accurately classify a question in terms of its level of cognition. It was therefore decided that professors teaching courses being classified would assist the project staff in the classification process. Participants studied the classification method under the direction of project staff. Examples of questions at each cognitive level were presented as well as key words which might be used in questions at each level (Appendix). Participants were also trained in classifying types of questions used in examinations and assignments into the four levels of cognition selected for the classification segment of this project.

Specific courses being taught by the participants were selected for assessment, making sure that both lower division and upper division courses were assessed.

In calculating percentage distributions of student learning across the levels of cognition, it was decided to use weighted percentages. Weighted percentages were calculated by multiplying raw percentages derived from the joint classification (for each type of activity classified, e.g., tests, homework, etc.) times the weight used in calculating a student's final grade for the course for that activity. Percentages for each level of cognition were calculated by summing the weighted percentage for each activity classified.

Data Collection

Data were collected through a two-stage process. Initially each participant, as well as a member of the project staff, independently classified questions used on tests, homework, laboratories, and term project assignments associated with each course selected for the study. Each professor then met with the project staff member. At this time a consensus was reached on the classification of each item. Information regarding the manner in which the subject matter was originally presented to the student was provided by the faculty member at this meeting. Such information is critical in making an accurate classification of the items.

RESULTS

Description of the Sample

The average age of the participants in the study was 44 years. Sixty-two percent were full professors in rank, while nineteen percent held the rank of associate professor and nineteen percent were assistant professors. The average length of service in the teaching profession was 13 years.

Twenty-five courses were selected for use in the study. Each course studied had been taught an average of 11 times by the participants.

Distribution of Learning Across the Levels of Cognition

Thirty-seven percent of the learning was at the remembering level (Table 1). Forty-four percent of the learning was at the processing level, 6% at the creating level, and 13% at the evaluating level.

Distribution of Levels of Cognition by Level of Course

Fifty-four percent of the learning in lower division (freshman/sophomore) courses was at the remembering level while 29% of the learning occurred at the remembering level in the upper division (junior/senior) courses (Table 2). Thirty-nine percent of the learning was at the processing level in the lower division courses as contrasted with 51% in the upper division courses. A small proportion of learning occurred

Table 1

Distribution of Learning Across the Levels of Cog

Level of Cognition	
Remembering	
Processing	
Creating	
Evaluating	
TOTAL	

t he creating and evaluating levels in t divis and 5% ev ating in the lower division courses and ev luatin the upper division courses.

Table

Distribution of Levels of Cognition by Level of

Division	R	
Lower division courses	54	
pper division courses	29	

Not : emembering; P=Proces in , C=Cr at , Eva

Distribution of Levels of Cog

hen exami ing the distribution of r the individual courses, substan le 3).

n the ower ivision courses, the occurring the remembering level wa the higher evels of cognition, the proce of 3- %, while creating had median of 0 evaluating had a median of 2.5% and a 0-17% ran .

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In upper division courses the median frequency for the remembering level was 27%, with individual courses ranging from 0-51%. Percentages at the processing level ranged from 24-92% with a median of 51%. The median frequency of learning at both the creating and evaluating levels was 8%, with ranges of 0-40% and 0-33% respectively.

Table 3

Distribution of Levels of Cognition by Course

	Overall Class Activity (weighted %)*				
Courses	R	P	C	E	Total
Lower Division					
A	97	3	0	0	100
B	84	16	0	0	100
C	83	17	0	0	100
D	75	13	12	0	100
E	74	21	0	5	100
F	34	65	0	1	100
G	33	51	1	15	100
H	32	55	3	10	100
I	15	81	0	4	100
J	12	70	1	17	100
Median	54	36	0	2.5	
Range	12-97	3-81	0-12	0-17	
Upper Division					
A	51	30	15	4	100
B	48	33	9	10	100
C	47	48	5	0	100
D	44	51	3	2	100
E	41	56	3	0	100
F	36	29	24	11	100
G	34	62	0	4	100
H	27	49	3	21	100
I	25	60	4	11	100
J	25	25	17	33	100
K	17	58	9	16	100
L	12	80	8	0	100
M	12	70	13	5	100
N	5	24	40	31	100
O	0	92	0	8	100
Median	27	51	8	8	
Range	0-51	24-92	0-40	0-33	

*Calculation of weighted percentage described on page 3.

Distribution of Levels of Cognition by Type of Course Activity Assessed

A variety of student activities is included in determining the final grade of a course. For this study, all graded activities in each of the courses were divided into two major groups: (1) tests and quizzes, and (2) assigned out-of-class student activity (e.g., laboratories, homework, individual and group projects, term papers, etc.). Each group of activities was then examined in terms of the levels of cognition to see if any distribution differences existed (Table 4).

Test and quiz questions for lower division courses were distributed across the levels of cognition as follows: remembering level - 61%; processing level - 35%; creating level - 1%; evaluating level - 4%. In terms of other assigned student activity, no activities were classified at the remembering level, 73% were at the processing level, 9% at the creating level, and 18% at the evaluating level.

In the upper division courses, one-third (33%) of test and quiz questions were classified as remembering, 51% processing, 6% creating, and 10% evaluating. Other assigned student activity had a greater percentage of higher level cognitive behavior in that 10% occurred at the remembering level, 55% were at the processing level, 17% were creating, and 18% were at the evaluating level.

Influence of Out-of-Class Acivities on Distribution of Learning Across the Cognitive Levels

The courses were divided into two groups and the distribution across the levels of cognition were examined. The two groups were: (1) those courses using only tests and quizzes to calculate the final grade; and (2) courses which also included out-of-class activities and student assignments in final grade determination.

For lower division courses that used only test and quiz grades to determine the final grade, 74% of the questions were at the remembering level; 23% required processing; 1% required creating; and 2% were at the evaluating level (Table 5). Those lower division courses which also included out-of-class activities in the grade determination had 41% of the total class activities occurring at the remembering level, 50% involved processing, 2% were at the creating level, and 7% were classified as evaluating.

Upper division courses showed the following distribution. Those courses calculating final grades based on test and quiz scores had 44% at the remembering level, 47% at the processing level, 5% at the creating level, and 4% at the evaluating level. Upper division courses that also included out-of-class activity in determining grades had 24% of the learning occurring at the remembering level, 52% at the processing level, 12% at both the creating and evaluating levels.

Table 4

Distribution of Levels of Cognition by Type of Course Activity Assessed

	Level of Cognition (in %)				
	R	P	C	E	Total
Lower Division Courses					
Tests and quizzes	61	35	1	4	100
Out-of-class activity	0	73	9	18	100
Overall	54	39	2	5	100
Upper Division Courses					
Tests and quizzes	33	51	6	10	100
Out-of-class activity	10	55	17	18	100
Overall	29	51	10	10	100
All Courses					
Tests and quizzes	44	44	4	8	100
Out-of-class activity	7	61	14	18	100
Overall	39	46	7	8	100

Note: R=Remembering; P=Processing; C=Creating; E=Evaluating

Table 5

Distribution of Learning Across Levels of Cognition for Courses With and Without Out-of-Class Assignments

Courses	Level of Cognition (in %)				
	R	P	C	E	Total
Lower Division					
With out-of-class activity	41	50	2	7	100
Without out-of-class activity	74	23	1	2	100
Upper Division					
With out-of-class activity	24	52	12	12	100
Without out-of-class activity	44	47	5	4	100

Note: R=Remembering; P=Processing; C=Creating; E=Evaluating

CONCLUSIONS

1. Involvement of the faculty member who taught the course in jointly classifying the distribution of learning across the levels of cognition was workable and the project staff felt it produced a more accurate assessment than completing the assessment without the involvement of the professor.

2. Faculty were very interested in learning how to assess levels of cognition, in helping with the assessment, and in learning how to teach and test at the higher levels of cognition.

3. There were wide fluctuations in distribution of learning across the levels of cognition among individual faculty members.

4. There was more learning at the remembering level in lower division courses and more learning at the processing level in the upper division courses. There was limited learning at the creating and evaluating levels for either course division.

5. In both lower and upper division courses, when instructors include laboratories, homework, individual and group projects, and term papers, more learning was found at the higher levels of cognition.

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Appendix

Vocabulary Useful in Developing Objectives and Test Items at Various Cognitive Levels

Remembering	Processing		Creating	Evaluating
acquire	analyze	infer	combine	appraise
cite	apply	interpolate	compose	argue
define	associate	interpret	constitute	assess
identify	categorize	outline	construct	conclude
label	change	paraphrase	create	consider
list	choose	point out	derive	decide
name	classify	predict	design	evaluate
recall	compare	prepare	develop	judge
recite	compute	rearrange	devise	standardize
recognize	contrast	relate	document	validate
reproduce	convert	reorder	formulate	weigh
state	deduce	rephrase	integrate	
	demonstrate	represent	modify	
	describe	restate	originate	
	detect	restructure	organize	
	determine	summarize	plan	
	differentiate	transfer	produce	
	discriminate	transform	propose	
	distinguish	translate	reorganize	
	draw	use	revise	
	estimate		rewrite	
	explain		specify	
	extend		synthesize	
	extrapolate		tell	
	generalize		transmit	
	illustrate		write	

Source. Adapted from:

Chamberlain, V. M. and Kelly, J. M. (1961). Creative home economics instruction. New York: McGraw Hill Book Company.

Clegg, A. A. (1968). Teacher strategies of questioning for eliciting selected cognitive student responses. (Research Report No. 1). Applied Research Training Program. University of Massachusetts.

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Reaction Statement for The Teaching Performance of Graduates of Teacher Education Programs in Vocational and Technical Education and Their Decision to Teach By George Wardlow

This study sought a determination of whether students in vocational and technical education fields were better (or worse) than students in non-vocational fields. Further, it sought to determine whether vocational students pursuing a teaching license were better (or worse) than students without such preferences.

The determinations were unequivocal; the researcher was never in doubt. Vocational and technical types are better than the non-vocational types. Said in another way, non-vocational education types are not as good as the vocational types. Besides, those in teacher-education programs who later enter teaching are better than those who don't. The situation is just as we might have hoped it would be.

We need to look, however, at how the researcher made judgments about who was, or wasn't better. Student teachers, 477 of them, were given a rating by one of their supervisors of which there were 38. These ratings, all made with a five-point Likert-type scale and largely on qualitative observations, constituted the data for the study. Ratings on fifty-nine vocational and technical student teachers allowed comparisons to be made with

the non-vocational and technical education types.

To add rigor, or to create the illusion of rigor, certain other manipulations were performed such as sampling (to reduce to number of subjects by 3 percent - 477 to 465), stratification (to differentiate the major fields) and randomization (to permit generalization). Questionable methodology included the use of Cochran's formula for determining sample size and also the calculation of confidence intervals around sample means. These should be regarded as questionable in adding to rigor because a Likert-type scale generates discrete data with equal intervals between ratings and no amount of aggregation will make it continuous. Continuous data is necessary for the measure of variation needed to estimate sample size or confidence intervals.

The researcher has identified and commented on the largest potential source of bias or error in the ratings, namely, the possibility that different raters used different standards of judgement in their ratings. Such potential biases or errors are inherent in the study as designed, they cannot be reduced.

It is difficult to see how this study adds much to the corpus of knowledge about selecting or preparing teachers in agricultural education. Nor is it possible to see what problem is defined/illuminated/solved/identified by this study. It offers some crude comparative judgments for satisfying curiosity but it does not offer enough precision to win much more. It was, after

all, a paper which drew entirely upon secondary sources of data; it should not be expected to contribute much to knowledge about preparing agriculture teachers.

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Reaction Paper Statement
on
Factors Associated With Problem Solving Ability of
High School Students Enrolled in Vocational Horticulture
by
J. Robert Warmbrod and Pongpan Chuatong

The paper has an introduction which begins with lamentation and concludes with hope. To describe the problem-solving performance of students, the introduction uses words like "uniformly poor performance", "discouraging", and the absence of "an empirical basis to substantiate its merit."

The introduction concludes with a clear and defensible rationale for inquiry and an understandable though fragile and perhaps false theoretical framework for the research. In describing the rationale, the researchers claim a fundamental premise, namely, that problem solving is a learnable (and thus a teachable) cognitive ability. Nothing could be more reassuring to an educator than to accept such an encouraging premise.

The authors then move ahead to describe what they call "the theory of problem solving instruction" which, in simpler language, is the explaining-power which informs the study and which is expected to be improved by the study in order to give even better explanations of how problem solving can be learned and taught. This is, or should be, the heart of the study.

Problem solving instructional theory as perceived in this effort, involves three factors. Here the language of the authors becomes opaque or evasive. They say that the theory on which they rely "takes into account" three factors. The author's analysis of data for the study would seem to require a more definitive verb like depends on three factors or even relies on three factors. This is not an issue of discursive semantics nor is it trivial; it is a question of how problem-solving is, or should be, defined or described. If it cannot be phrased in some explanatory way, then the concept of problem solving is not researchable, at least not beyond the stage of attempting to define it.

We turn, then, to the three theory-defining factors which the study identifies with problem-solving instruction. They are (1) a knowledge base in subject-matter, (2) problem-solving strategies and (3) individual differences. The authors argue the case for this rationale by citing a number of contributions to the literature. Since it is often difficult to obtain direct measures of these factors, it is sometimes necessary to turn to surrogates or indicators. The authors have provided them. In this research the knowledge-base indicator was an achievement test in horticulture, the problem-solving strategies were indicated by some program variables such as a test of problem-solving teacher behavior and some measures of SOE activity and, finally, individual differences were measured by a test of academic aptitude. How the researchers could regard academic

aptitude as an indicator of, or even parallel to, individual differences is not explained anywhere in the Report.

To understand and to clarify their work, the authors turned to the technique of multiple regression/correlation. Simultaneously they totally abandoned the theoretical framework which they had earlier offered as a base. Instead they now decided arbitrarily that problem solving ability was determined by a 38 item test which they had developed and administered. It was labeled rather imaginatively as the Solving Problems in Horticulture Test.

In the regression analysis, problem-solving ability and achievement in horticulture were regarded as dependent variables. More variation in the dependent variables was explained by the academic aptitude of students than any other variable. Certainly we should not be surprised to learn that academic aptitude and academic achievement are highly correlated. There are many reputable There are many reputable scholars who argue that one is a measure of the other. We can be at least mildly surprised to learn, accordingly, that the authors believe that this correlation unlocks any of the mystery of problem solving.

The study did not achieve its first objective, namely, to describe students in terms of their ability to solve problems. They can be described in terms of their scores on a test but there is no way of deciding whether, or under what conditions, the test has anything to do with problem solving. Validity

cannot be achieved by declaration.

The study met its second, third and fourth objective but meeting these did not add much to the corpus of knowledge described by the researchers as the theoretical base of this research.

Finally, the study added very little to the base of knowledge about the dynamics of the instructional processes and the influence of this process on the problem solving ability of students or teachers. But, you see, the study didn't promise to do that.

Gordon Swanson
University of Minnesota

Reaction To Levels of Cognition of Testing and Student Assignments in the College of Agriculture, The Ohio State University by Newcomb and Trefz

I shall refer to the study as the Newcomb/Trefz study. It is a difficult one to categorize or to classify. It is somewhat mistitled (e.g. too limiting) and its scope is somewhat misrepresented; its boundaries, for example, go far beyond cognition. Yet it is these same features which make it one of the most imaginative and provocative studies in the field in recent years.

Most studies are conceptually vacuous and methodologically overburdened. This one is conceptually complex and methodologically simple. To stay on track, I will use some of the headings in the guidelines.

Significance and Impact

It is most unusual when a research project is fashioned to allow an operating system (e.g. a flow of instruction) to become an inquiring system (e.g. a way of looking analytically at one's work). This is the case with the reported study. A bunch of professors began to look at their own work as instructors and to generate important questions. Here, then, is a second unusual element of the study, e.g. questions raised become as important as answers found. The study became a framework for thinking and

acting on, instructional improvement. This holds the seeds of significant impact.

Theoretical Framework and Further Research

This research began with a what if question. What if one began with a product paradigm and adapted it for use as a process paradigm? Said differently, what if one took a framework used to explain a taxonomy of objectives and transformed it into a framework to explain a taxonomy of instruction? It is clear the researchers began with a what if question and provided a design for a way to explain some important elements of instruction in a College of Agriculture.

The research is likely to prompt a flurry of activity, not replications but mere variations of "inquiring systems within operating systems", using ideas generated by this research.

Methodology and Related Matters

The authors claim this to be a descriptive study. This is the only soaring rhetoric in the entire report. All research is descriptive or it does not qualify as research. After all, if one cannot describe, one cannot decide.

It is in the area of theory and methodology that this research or at least this line of inquiry, can repay a careful critique. I will enumerate the concerns which I have.

1. The title of the paper addresses "levels of cognition." Yet the four-stage paradigm used to classify instructional activity in the College of Agriculture involves much more than cognition. One must be careful not to assume that all instruction is within the cognitive domain. Mislabeling can also be misleading. Memory, for example, may be as important to the affective and psychomotor domains as to the cognitive. The point here is that the word cognition serves absolutely no descriptive purpose if it requires fidelity to boundary lines which are artificial.

2. The population of the study was described as faculty members, 188 of them. One wonders what relevance this population has to the conceptual scheme of the research.

There are other populations which were left undescribed which were far more relevant to the conceptual scheme of the research.

One was the population of taxonomy categories which could have been chosen. With the help of David Krathwohl, the authors picked four but there is no guarantee that four exhausts the total supply of possibilities which could have been chosen. The population consists of all which might have been chosen.

A second population consists of the instructional chunks,

whatever they were, which were placed in one of the four categories described above. The number of chunks to be remembered, processed, created or evaluated is an important population in this study.

A third population consists of the vocabulary designators used to designate the instructional chunks identified above as the second population. These vocabulary designators appear in the appendix of the report. This third population is not irrelevant to the conceptual framework of the study; it deserves description as a population. Is the listing in the appendix a description of the total supply, a partial supply or some kind of sample?

3. The report discusses a sample but no sampling was done, nor was any necessary. The notion of a sample and sampling adds nothing but clutter to this rather sophisticated study.

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3. The report discusses a sample but no sampling was done, nor was any necessary. The notion of a sample and sampling adds nothing but clutter to this rather sophisticated study.

PROFESSIONAL COMPETENCIES NEEDED BY BEGINNING COOPERATIVE EXTENSION AGRICULTURAL AGENTS IN MINNESOTA, NORTH DAKOTA, AND SOUTH DAKOTA

by

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INTRODUCTION

County agricultural extension agents form the largest part of the total professional employees of the Cooperative Extension Service in Minnesota, North Dakota, and South Dakota. It is also the major group that carries most of the agricultural educational information from the agencies to the public and the needs of this public to the agencies. Because of their visible position in the organization, they must be very well prepared. The role of the Cooperative Extension Service has undergone considerable changes in the last 10 years (Sappington et al., 1977). The competencies needed in the past have changed and increased in number. The dynamics of the extension program made it imperative that the preparation and development of the agent be in line with modern day programs.

Gonzalez (1982) stated that historically the educational philosophy has been to establish curricula which provide only for the acquisition of cognitive knowledge. He argues that the mastery of the knowledge alone does not insure that the individual can successfully apply what he has learned. It is important, therefore, that the agent develop the proper skills, knowlege, abilities, and attitudes (competencies) necessary to effectively carry out the role of the county extension agent as a result of either the pre-service and/or graduate program and work experience including in-service training. It is necessary to identify competencies so existing educational programs can be modified and upgraded in order to provide present and future extension agents with the most critical competencies needed.

Beeman et al. (1979) identified and verified the professional competencies needed by extension agents in Florida. Of the 158 competencies identified and studied, extension field agents perceived 79% to be at least moderate to very high in importance while state staff rated 97% as moderate to very high in importance. The researchers recommended that the most essential competencies be included in the undergraduate and graduate curricula of the Department of Agricultural and Extension Education.

Gonzalez (1982) identified 144 professional competencies needed by extension agents in Pennsylvania. He defined professional competencies as "those skills, knowledge, and attitudes extension agents should possess in order to effectively perform their roles as educators, exclusive of technical subject matter competencies." His findings indicated that there were no significant differences in the perceptions of exten-

sion agents and state staff members regarding the importance of the nine competency categories. All 144 competencies were considered to be moderate to very high in importance. The two groups rated 68 competencies 4.00/5 or higher, while the remaining 76 competencies received combined ratings of at least 3.00/5. In identifying when the competencies should be learned, the combined responses for extension agents and state staff members indicated that 26 competencies should be learned before entering the job, 6 competencies during a graduate program, and the remaining 113 can be learned on the job or through in-service. Gonzalez (1982) recommended that competencies included in the teaching, communication, and understanding human behavior categories should form a key component of any undergraduate program developed for preparing extension agents.

PURPOSE AND OBJECTIVES

The purpose of this study was to identify the professional competencies needed by beginning agricultural agents of the Cooperative Extension Services of Minnesota, North Dakota, and South Dakota.

The specific objectives were:

1. To determine the importance of selected professional competencies needed by beginning Cooperative Extension Service county agricultural agents in Minnesota, North Dakota, and South Dakota as perceived by the agents themselves.

2. To determine the education mode (i.e. college courses, on-the-job training or special workshops) most appropriate for the development of the selected competencies.

3. To compare findings among agricultural county agents in Minnesota, North Dakota, and South Dakota with regard to the importance of selected professional competencies needed by beginning Cooperative Extension Service county agricultural agents and the educational mode indicated for the development of these competencies.

PROCEDURES

Population

The population of this study consisted of all county agricultural agents with at least one year but no more than five years of extension work experience, presently employed by the Cooperative Extension Service of Minnesota, North Dakota, or South Dakota. There were a total of 78 agents distributed as follows: Minnesota - 43, North Dakota - 13, and South Dakota - 22. The investigator obtained permission and support from the administration of the three states' Cooperative Extension Services. The personnel section of the three services provided the names and current addresses of the agents to be surveyed.

Instrumentation

Data for this study were collected by use of a questionnaire mailed to each member of the population. The procedures used were consistent with those used in similar studies in other states. As a result of reviewing the relevant literature, particularly Gonzalez's study in Pennsylvania, a substantial amount of information usable in the development of the questionnaire for this study was identified. An adapted instrument for use in this research was developed.

The competencies included in the questionnaire were selectd on the basis of their importance in enabling the extension agents to perform the task or responsibility expected from him or her. The instrument was reviewed for validation purposes by a jury of extension personnel responsible for extension staff development and the extension district directors.

As a result of the review procedures, a final questionnaire which included 40 competency statements was developed. The questionnaire was divided into two sections. The statements in Section I consisted of items related to pertinent demographic data needed from the respondents. Section II included the competency statements. That second section consisted of two parts. Part 1 was designed using a five-point Likert scale with numerical values assigned for all possible responses to the competencies as follows: 1=no importance, 2=low importance, 3=moderate importance, 4=high importance, and 5=very high importance. Part 2 consisted of items related to the time most appropriate for the development of the competencies. The possible responses were as follows: 1=undergraduate curriculum, 2=graduate curriculum, 3=on-the-job training, and 4=special workshop and/or conference.

Data Collection

A cover letter explaining the purpose of the research and soliciting participation from the potential respondents was prepared and co-signed by the investigator and major advisor. The coded questionnaire, the cover letter, and a self-addressed stamped envelope were mailed to the 35 beginning agricultural extension agents in North Dakota and South Dakota on October 18, 1985; and to the 43 agents in Minnesota on November 21, 1985. Three weeks after the first mailing, a follow-up letter, duplicate questionnaire, and self-addressed stamped envelope were sent to those who had not responded. Telephone calls were made to the remaining agents who had not responded after the two mailings. On December 26, 1985, the last questionnaire was returned, resulting in a 100% return.

Data Analysis

The collected data were entered in the NDSU computer for analysis. The means, frequencies, standard deviations, and percentages of all responses were tabulated. Because the sample consisted of the entire

population and a 100% response was received, inferential statistics were not used. The instrument was tested using Cronbach's alphas to provide a measure of reliability of Likert scales. The Cronbach's coefficient alpha for the eight competency categories studied was 0.93.

RESULTS

The importance of selected professional competencies needed by beginning county agricultural extension agents as indicated by mean scores is revealed in Table 1. Those competencies receiving the highest rating of importance (4=high importance to 5=very high importance) were: Able to get along with people ($\bar{x}$=4.77); Able to remain current through regular reading, workshops, and conferences ($\bar{x}$=4.74); Able to develop support of local people for extension programs ($\bar{x}$=4.71); Able to assess county situations and needs ($\bar{x}$=4.38); Able to identify priority programs ($\bar{x}$=4.34); Public speaking ability ($\bar{x}$=4.19); Understand principles of communication ($\bar{x}$=4.14); Write effective reports and news articles ($\bar{x}$=4.13); and Able to identify and select appropriate physical, material, and human resources to meet program needs ($\bar{x}$=4.03). The competency "knowledge of psychological theories of learning" was ranked the least important ($\bar{x}$=2.88). All other competencies had a mean score of 3 (moderately important) or higher.

When comparing mean scores among states, only slight differences in ratings occurred. Minnesota agricultural agents rated 18 of the 40 competencies higher than the North and South Dakota agents. South Dakota agents rated 11 competencies highest; North Dakota agents rated nine highest. Minnesota and South Dakota agents rated one competency highest with equal mean scores; North and South Dakota agents also rated one highest with equal mean scores.

Respondents were asked to indicate the educational mode in which competencies should be developed. The modes included: undergraduate program, graduate program, on-the-job training, and special workshops and/or conferences.

Table 2 reveals that a majority of the respondents felt that most of the professional competencies in the categories of Extension Philosophy and Organization; Extension Program Development, Operation, and Evaluation; Community Structure Within the County; Public Relations; and Administration could be developed while on the job. A majority of the agents felt that most competencies in the cateogry of Communication and Teaching should be developed through college undergraduate programs. Competencies in the Research category should be developed throughout each of the educational modes.

A comparison of the responses by the agricultural agents in the three states concerning the educational mode by which competencies should be developed revealed responses to be quite similar. Therefore, those results were not reported in this report.

TABLE 1-Mean Scores of the Importance of Selected Professional Competencies Needed by Beginning County Agricultural Extension Agents

Competencies	Rank	Mean Scores* MN N=43	ND N=13	SD N=22	Combined Means N=78	Standard Deviation
I. EXTENSION PHILOSOPHY AND ORGANIZATION:						
1. Knowledge of the general philosophy of the Cooperative Extension Service (CES)	34	3.51	3.45	3.27	3.44	0.97
2. Knowledge of history and objectives of the CES	37	3.34	3.53	3.09	3.31	0.94
3. Knowledge of the organizational structure policies that govern the CES	37	3.25	3.23	3.45	3.30	0.97
4. Understanding relationship between extension county and area personnel, specialists, the land-grant college or university, and the USDA	27	3.79	3.53	3.59	3.69	0.92
II. EXTENSION PROGRAM DEVELOPMENT, OPERATION, AND EVALUATION:						
1. Able to assess county situations and needs	4	4.41	4.46	4.27	4.38	0.75
2. Able to organize/use advisory groups effectively	11	3.25	3.61	4.09	3.94	0.76
3. Able to identify and select appropriate physical, material, and human resources to meet program needs	9	4.04	4.07	3.95	4.03	0.60
4. Able to identify priority programs	5	4.40	4.00	4.40	4.34	0.64
5. Able to design balanced (non-discriminatory) educational program	23	3.80	3.30	3.72	3.70	0.97
6. Able to set measurable and achievable objectives	14	4.02	3.53	3.86	3.90	0.85
7. Able to develop extension program plan of work	30	3.73	3.23	3.68	3.63	1.07
8. Able to evaluate extension programs	21	4.00	3.15	3.81	3.81	0.84
III. COMMUNICATING AND TEACHING:						
1. Understand principles of communication (process)	7	4.34	3.92	3.86	4.14	0.80
2. Public speaking ability	6	4.30	4.23	3.95	4.19	0.68
3. Write effective reports and news articles	8	4.18	4.07	4.04	4.13	0.73
4. Effective use of visual aids in extension work	17	4.02	3.61	3.54	3.82	0.89
5. Use audio-visual equipment to supplement and complement instruction	22	3.93	3.38	3.50	3.72	0.80
6. Organize, conduct, and evaluate effective tours and demonstrations	28	3.62	3.84	3.68	3.68	0.80
7. Understand adult learning process	17	3.90	3.53	3.81	3.82	0.73
8. Can effectively use various teaching methods	13	4.04	3.69	3.85	3.93	0.83
9. Knowledge of psychological theories of learning	40	3.02	2.53	2.81	2.88	1.04
10. Use computer in instruction and to provide information	15	3.93	3.46	4.00	3.88	0.89
11. Able to conduct personal interviews (farm/home visits, surveys, office calls, etc.)	10	3.90	4.38	3.86	3.97	0.90

TABLE 1-Mean Scores of the Importance of Selected Professional Competencies Needed by Beginning County Agricultural Extension Agents, Cont.

Competencies	Rank	Mean Scores* MN N=43	ND N=13	SD N=22	Combined Means N=78	Standard Deviation
IV. COMMUNITY STRUCTURE WITHIN THE COUNTY:						
1. Understand community organizational structure	32	3.58	3.38	3.45	3.51	0.85
2. Recognize and use county formal and informal leaders	16	3.88	3.69	3.81	3.83	0.71
3. Cooperate/participate in county organizations	23	3.69	3.53	3.81	3.70	0.84
4. Able to consider client's value system in developing an extension program	17	3.83	3.76	3.81	3.82	0.75
V. PUBLIC RELATIONS:						
1. Able to explain county/state/national government agricultural programs and policies to clients	35	3.44	3.23	3.50	3.42	1.04
2. Able to use all appropriate opportunities to inform people about the CES and the USDA	28	3.62	3.38	3.95	3.68	1.055
3. Able to develop support of local people for extension programs	3	4.41	4.61	4.40	4.71	0.71
VI. ADMINISTRATION:						
1. Able to prepare reports and maintain records on extension programs	36	3.53	3.15	3.22	3.38	0.91
2. Able to work within limits of office resources	23	3.60	3.61	3.95	3.70	0.82
3. Able to use a filing system	33	3.39	3.69	3.59	3.50	0.83
4. Able to supervise, coordinate, and evaluate activities of county office staff	31	3.44	4.00	3.72	3.61	0.90
5. Able to handle office correspondence	11	3.88	4.00	4.00	3.94	0.74
6. Able to get along with people	1	4.81	4.92	4.59	4.77	0.51
VII. RESEARCH:						
1. Able to conduct validation research program	39	3.04	2.38	3.31	3.01	1.11
2. Able to understand/interpret research findings	17	3.74	3.53	4.13	3.82	0.85
VIII. CONTINUING EDUCTION						
1. Take sabbatical leave to go to school	23	3.79	3.15	3.86	3.70	1.10
2. Able to remain current through regular reading, workshops, and conferences	2	4.74	4.69	4.77	4.74	0.47

*Mean scores were calculated using the following weighting scale:

5 = very high importance
4 = high importance
3 = moderate importance
2 = low importance
1 = no importance

TABLE 2-Educational Modes in Which Competencies Should Be Developed

Competencies	Educational Modes (N = 78)							
	UP*		GP*		OJT*		SW/C*	
	#	%	#	%	#	%	#	%
I. EXTENSION PHILOSOPHY AND ORGANIZATION:								
1. Knowledge of the general philosophy of the Cooperative Extension Service (CES)	26	33	1	1	41	53	14	18
2. Knowledge of history and objectives of the CES	29	37	1	1	38	49	14	18
3. Knowledge of the organizational structure policies that govern the CES	13	17	1	1	48	61	17	22
4. Understanding relationship between extension county and area personnel, specialists, the land-grant college or university, and the USDA	11	14	2	3	50	64	16	20
II. EXTENSION PROGRAM DEVELOPMENT, OPERATION, AND EVALUATION:								
1. Able to assess county situations and needs	14	18	7	9	43	55	19	24
2. Able to organize/use advisory groups effectively	23	29	7	9	30	38	25	32
3. Able to identify and select appropriate physical, material, and human resources to meet program needs	24	31	3	4	42	54	12	15
4. Able to identify priority programs	15	19	2	3	47	60	2	3
5. Able to design balanced (non-discriminatory) educational program	26	33	3	4	38	49	1	1
6. Able to set measurable and achievable objectives	37	47	7	9	21	27	1	1
7. Able to develop extension program plan of work	10	13	1	1	44	56	1	1
8. Able to evaluate extension programs	19	24	12	15	28	36	31	40
III. COMMUNICATING AND TEACHING:								
1. Understand principles of communication (process)	65	83	5	6	5	6	7	9
2. Public speaking ability	70	90	1	1	11	14	4	5
3. Write effective reports and news articles	67	86	2	3	9	11	8	10
4. Effective use of visual aids in extension work	46	59	2	3	17	22	18	23
5. Use audio-visual equipment to supplement and complement instruction	43	55	2	3	20	26	15	19
6. Organize, conduct, and evaluate effective tours and demonstrations	18	23	0	0	48	61	14	18
7. Understand adult learning process	48	61	15	19	6	8	1	1
8. Can effectively use various teaching methods	51	65	8	10	10	13	1	1
9. Knowledge of psychological theories of learning	50	64	14	18	8	10	9	11
10. Use computer in instruction and to provide information	42	54	5	6	20	26	29	37
11. Able to conduct personal interviews (farm/home visits, surveys, office calls, etc.)	18	23	4	5	53	68	10	13

TABLE 2-Educational Modes in Which Competencies Should Be Developed, Cont.

Competencies	Educational Modes (N = 78)							
	UP*		GP*		OJT*		SW/C*	
	#	%	#	%	#	%	#	%
IV. COMMUNITY STRUCTURE WITHIN THE COUNTY:								
1. Understand community organizational structure	7	9	4	5	58	74	8	10
2. Recognize and use county formal and informal leaders	5	6	1	1	59	76	15	19
3. Cooperate/participate in county organizations	3	4	0	0	68	87	6	8
4. Able to consider client's value system in developing an extension program	13	17	7	9	51	65	11	14
V. PUBLIC RELATIONS:								
1. Able to explain county/state/national government agricultural programs and policies to clients	12	15	3	4	37	47	29	37
2. Able to use all appropriate opportunities to inform people about the CES and the USDA	11	14	1	1	52	67	17	22
3. Able to develop support of local people for extension programs	8	10	3	4	52	67	23	30
VI. ADMINISTRATION:								
1. Able to prepare reports and maintain records on extension programs	13	17	2	3	45	58	22	28
2. Able to work within limits of office resources	16	20	2	3	56	72	9	11
3. Able to use a filing system	23	30	1	1	52	67	7	9
4. Able to supervise, coordinate, and evaluate activities of county office staff	6	7	9	11	51	65	15	19
5. Able to handle office correspondence	18	23	2	3	53	68	8	10
6. Able to get along with people	41	53	4	5	40	51	9	11
VII. RESEARCH:								
1. Able to conduct validation research program	12	15	31	40	25	32	17	22
2. Able to understand/interpret research findings	28	36	19	24	20	26	18	23

*Classifications:

UP = Undergraduate program
GP = Graduate program
OJT = On-the-job training
SW/C = Special workshop and/or conference

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based upon the findings of this study, the following major conclusions were formulated:

1. Most of the competencies are important and needed by beginning agricultural extension agents in Minnesota, North Dakota, and South Dakota

2. Most of the selected professional competencies should be developed through training while on the job and during undergraduate programs.

3. No noticeable differences occurred in the perceptions of beginning Cooperative Extension Service county agricultural agents in Minnesota, North Dakota, and South Dakota with regard to the importance of selected professional competencies needed by beginning Cooperative Extension Service county agricultural agents and the educational mode indicated as most appropriate for the development of these selected competencies.

Recommendations

Based on the findings and conclusions resulting from this study, the following recommendations are offered:

1. The findings of this study should be made available to the administrations of the Cooperative Extension Services in Minnesota, North Dakoa, and South Dakota, particularly to individuals responsible for planning and providing pre-service, and in-service training programs for extension agents.

2. The content of undergraduate and graduate programs in extension education should address as many as possible of the comptencies found to have moderate to very high importance. The competencies in the categories of Communication & Teaching and Research as indicated in the study should most definitely be acquired during undergraduate or graduate studies.

3. Many professional competencies, as reported by agricultural extension agents, might best be developed through on the job training. With this in mind, if extension education programs included an internship experience in which some of these professional competencies can be developed, an agricultural extension agent would have acquired the competencies before beginning his/her first job.

4. Appropriate and practical instructional materials and behavioral objectives should be developed and/or adapted for the 40 professional competencies identified in the study for use in institutions preparing county agricultural extension personnel.

5. Research directed at determining the present level of professional competency of the county agricultural extension agents and the relationship between level of competence to program effectiveness should be conducted.

6. If this study should be replicated, a correlation between demographic data and perceptions of county agricultural extension agents should be researched.

7. Research should be conducted to determine the technical competencies needed by county agricultural extension agents.

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DELIVERY OF ADULT AGRICULTURAL EDUCATION: A CASE STUDY

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INTRODUCTION

Understanding the needs of adults in agriculture has been very critical to the proper selection of programs, methods, and relevant subject matter for the development of effective educational programs. An accurate assessment of needs and interest through a needs assessment is essential to the formulation of curricula for educational programs (Hunsicker, 1974). Boulmetis (1981) stated that one of the keys to success of any delivery system is how accurately the needs of the participants have been identified and are subsequently met.

In the United States, adult agricultural education is offered by a wide variety of agencies (Knowles, 1969). Although each agency tries to serve a selected population, there is considerable overlap of services and activities (Marshall, 1978). If educational planners were to communicate their offerings and services, the programs in adult agricultural education could improve, since duplication of services might be reduced (Hilton, 1979).

By identifying the deliverers of agricultural education for adults, the clientele which is served, and their respective needs; educational planners will better be able to develop programs which reflect the projected educational needs of farmers and agribusiness personnel in the future. In turn, through articulation between educational planners of various purveyors of education, duplication of services should be reduced and ultimately avoided (Hilton, 1979).

PURPOSE AND OBJECTIVES

The purpose of this study was to determine the status of the current efforts in delivering adult agricultural education by vocational agriculture, Cooperative Extension Service, and the agribusinesses in order to propose alternative educational delivery systems.

The objectives of this portion of the study were to:

1. determine the status of adult education offerings in agriculture by the Ohio Cooperative Extension Service, public

schools (high schools, technical institutions, and Ohio State University resident instruction), and related agencies;

2. determine why adult education programs are not offered by some school systems;

3. ascertain the needs for adult education programs in agriculture; and,

4. project the number of persons who would participate in adult education programs in agriculture.

PROCEDURES

Population and Sample

The population for this study consisted of all farmers and agribusinesses in Clark and Knox County, Ohio. A random sampling of farmers (n=185) and agribusinesses (n=154) was obtained. A census was used from the public school teachers of agriculture (N=18) and from the county extension agents (N=6) in the selected counties.

One hundred eighty-five farmers were asked to participate in the study. Usable responses were received from 84 farmers for a 45.4 percent response rate. One hundred fifty-four agribusinesses were asked to participate in the study. Usable responses were received from 42 agribusinesses for a 27.3 percent response rate.

Design of the Study

This study employed survey research methodologies.

Instrumentation

Researcher-developed mailed questionnaires and supplemental personal interview schedules were the instruments used in the process of data collection. The mailed questionnaires consisted of two parts: Part I solicited answers to demographic characteristics while Part II sought answers to the respondents' perceived educational needs.

The instruments used to collect the data were validated by a panel of experts. The reliability for the farmers' questionnaire was $\alpha = .88$, and for the agribusinesses was $\alpha = .81$, with Cronbach's Alpha.

The process of triangulation was used to obtain richer information on the agribusiness subjects from personal interviews. A random sample of twenty percent of the subjects was chosen.

Data Collection

Data were collected by mailed questionnaire and a supplemental personal interview. The original mailing generated 67 responses

(36.8 percent) from the farmers and 36 responses (23.4 percent) from the agribusinesses. Non-respondents were followed-up with the mailing of a complete package which generated and additional 20 responses from the farmers and 13 additional responses from the agribusinesses. A third mailing was completed for the non-respondent farmers which generated an additional 13 responses. The total respondents for this study were 100 farmers (54.1 percent) and 49 agribusinesses (31.8 percent). Sixteen farmer questionnaires were found to be unusable as were seven agribusiness questionnaires. Thus, the responding sample was 84 farmers (45.4 percent) and 42 agribusinesses (27.3 percent). A random sample of ten percent of the non-respondent farmers and agribusinesses were obtained and personal interviews were conducted. No significant differences were noted between the respondent and non-respondent farmers and the respondent and non-respondent agribusinesses.

RESULTS

Description of Sample

The typical farmer in this study was a male who had been engaged in the farming profession an average of 22 years. Likewise, the typical agribusiness owner/manager was a male who had been in the agribusiness profession an average of 19 years. Forty-three percent of the farmers reported attaining some education beyond the high school diploma. The agribusiness owners/mangers reported that 73 percent had received some education beyond the high school diploma.

Status of Adult Education Offerings in Agriculture

Table 1 shows that the overwhelming majority of farmers (74.0 percent) have personnally participated in adult education classes in agriculture. Of the agribusiness owners/mangers 60 percent reported that they had enrolled in adult education classes in agriculture as a participant.

Table 1

Number and Percent of Prior Enrollment in Adult Education Classes

Type of Respondent	Enrolled f	Enrolled %	Not Enrolled f	Not Enrolled %
Farmer	57	74.0	20	26.0
Agribusiness Manager/ Owner	24	60.0	16	40.0

Missing Data: Farmers=7 Agribusiness=2

In regards to which agency should provide the educational services to the farmers, the Cooperative Extension Service was

ranked by farmers as the most important agency (Table 2). The agribusinesses were ranked the lowest on importance of who should provide educational services to farmers. A numerical ranking of one to six was used with number one being felt most important to provide educational services to farmers and six being felt least important.

Table 2

Ranking of Agencies By Mean and Standard Deviation Which Should Provide Educational Service to Farmers

Agency	Mean	SD
Ohio Cooperative Extension Service	2.49	1.60
Joint Vocational Schools	3.39	1.54
Colleges and Universities	3.43	1.68
High Schools	3.78	1.93
Technical Schools	3.96	1.29
Agribusinesses	3.97	1.73

Tables 3 and 4 present findings on the ranking of agencies that agribusiness owners/mangers felt should provide educational service to their employees and to them respectively. A numerical ranking of one to six was used with one being felt the most important to provide educational services to employees and the owners/managers and six being felt the least important to provide educational services to employees and the owners/managers. Agribusiness managers/owners indicated that Joint Vocational Schools should provide educational services to their employees and that product line companies (John Deere, Dekalb, Marathon) should provide educational services to them (Tables 3 and 4). Table 3 and Table 4 also show that agribusiness managers/owners felt that high schools were the least important agency that should provide educational services to them and their employees.

Table 3

Ranking of Agencies By Mean and Standard Deviation Which Should Provide Educational Services to Agribusiness Employees

Agency	Mean	SD
Joint Vocational Schools	2.95	1.39
Ohio Cooperative Extension Service	3.28	1.74
Vocational Technical School	3.43	1.46
Product Line Companies	3.50	2.12
Colleges and Universities	3.56	1.75
High Schools	3.74	1.84

Table 4

Ranking of Agencies By Mean and Standard Deviation Which Should Provide Educational Services to Agribusiness Owners/Managers

Agency	Mean	SD
Product Line Companies	2.56	1.84
Colleges and Universities	2.69	1.64
Ohio Cooperative Extension Service	2.89	1.58
Joint Vocational Schools	3.79	1.52
Vocational Technical Schools	3.82	1.33
High Schools	4.63	1.72

Through the use of personal interviews of 18 public school teachers and 6 county extension agents, 61.1 percent of the teachers reported that they should not be the purveyors of adult agricultural education classes, but that it should come from related agencies such as the Soil Conservation Service, Cooperative Extension Service, and the Agricultural Stabilization Conservation Service. Of the county extension agents interviewed, 58.3 percent felt that adult agricultural education classes should be conducted by the county agents.

Table 5 shows that high schools, followed by colleges and universities, were the educational systems which most often asked the opinion of the agribusiness owners/managers concerning the educational needs of their employees and of the owners/managers.

Table 5

Number and Percent of Educational Agencies Asking Opinion of Agribusiness Owners/Managers Concerning Educational Needs

Agency	f	%
High Schools	16	18.5
Colleges and Universities	14	16.1
Ohio Cooperative Extension Service	13	14.9
Joint Vocational Schools	13	14.9
Product Line Companies	12	13.8
Other	4	4.6
Never Asked	4	4.6
Total	87	100.0

Data on the types of educational agencies which have provided programs in which farmers have participated are reported on Table 6. Findings revealed that programs offered by agribusinesses and the Cooperative Extension Service were the most used.

Table 6

Participation By Farmers In Selected Adult Agricultural Education Programs By Number and Percent

Program Sponsor	f	%
Agribusinesses	42	33.6
Ohio Cooperative Extension Service	37	29.6
High School	36	24.8
Joint Vocational Schools	10	8.0
Industrial Technical Colleges	3	2.4
Industrial Technical Colleges (Part-time Classes)	2	1.6
Total	125	100.0

Table 7 presents data on the types of public education training programs in which agribusiness owners/managers had participated. Findings revealed that programs offered by agribusinesses and the Ohio Cooperative Extension Service were the most used.

Table 7

Participation By Agribusiness Owners/Managers In Selected Adult Agricultural Education Programs By Number and Percent

Program Sponsor	f	%
Agribusinesses	20	23.8
Ohio Cooperative Extension Service	19	22.6
Colleges and Universities	11	13.1
Industrial Technical Colleges	10	11.9
Joint Vocational Schools	9	10.7
High Schools	9	10.7
Industrial Technical Colleges (Part-time Classes)	6	7.2
Total	84	100.0

Status of Adult Agricultural Education in Public Schools

Objective two of this study was to ascertain why adult education programs are not being offered by some school systems. Approximately 61 percent stated the primary reason for not offering adult education classes was that the classes were already being offered by other agencies (Table 8). The other reasons reported for not providing adult education clases were: take too much time (22.2 percent), lack of enrollment (12.3 percent), and not enough pay for the services (5.4 percent).

Table 8

Ranking By Number and Percent Of The Primary Reasons Why Adult Agricultural Education Classes Are Not Offered By School Systems

Reason	f	%
Classes offered by other agencies	11	61.1
Takes too much of my time	4	22.2
Lack of enrollment	2	12.3
Not enough pay for the services	1	5.4
Total	18	100.0

Need For Adult Education In Agriculture

The third objective of this study was to determine the needs for adult education programs in agriculture. Table 9 shows that approximately 75 percent of the farmers reported that there was a need for adult education classes in agriculture. Approximately 76 percent of the agribusiness owners/managers responded in favor of a need for adult education classes in agriculure.

Table 9

Respondents Felt Need For Adult Education Classes In Agriculture

Respondent	Felt Need		No Felt Need	
	f	%	f	%
Farmers	55	75.3	18	24.7
Agribusiness	29	76.3	9	23.7

Tables 10 and 11 present the mean and standard deviation scores to statements which ascertained the needs for adult education programs in agriculture to farmers and agribuisness owners/managers. A numerical rating scale was used for measurement of the preceived educational needs of the farmers and the agribusinesses. The scale for this study employed a rating system of does not apply (12), strongly agree (10), agree (9, 8, 7), slightly agree (6), slightly disagree (5), disagree (4, 3, 2), and strongly disagree (1).

Table 10

Rank Order Of Farmers Agreement To Statements Regarding Adult Education In Agriculture By Mean and Standard Deviation

	Statement	Mean	SD
1.	I am never too old to learn.	9.46	1.71
2.	Job becoming more complex	8.84	2.32
3.	Need to be kept up-to-date	8.42	2.69
4.	OCES programs highly beneficial	8.33	2.54
5.	Take part yearly to stay current	8.18	2.91
6.	Utilized OCES experts	7.70	2.67
7.	Technical schools should have more beneficial classes	7.61	2.50
8.	More time needed for social interaction at classes	7.58	2.61
9.	OCES programs related to my needs	7.45	2.72
10.	More time need for problem discussion during class time	7.34	2.56
11.	Classes have helped me in the past	7.30	3.50
12.	Plan to particpate during the next year	7.29	3.46
13.	OCES should offer more programs in the local community	7.28	2.54
14.	Classes are held at convenient locations	7.13	3.05
15.	Know of classes offered by government agencies in community	7.07	3.33
16.	Plan my schedule to allow time to attend classes	6.95	2.87
17.	Colleges and universities should do more in the area of adult education	6.75	3.00
18.	Willing to pay tuition and fees	6.65	3.06
19.	OCES offers classes in my area	6.54	3.57
20.	Classes offered at convenient times	6.36	3.33
21.	Local high school should do more in the area of adult education	6.25	3.00
22.	More one-to-one instruction is needed at my farm	5.95	3.05
23.	High school is willing to offer more programs in adult education	5.72	3.27

Table 11

Rank Order Of Agribusiness Owners/Managers Agreement To Statements Regarding Adult Education In Agriculture By Mean and Standard Deviation

Statement	Mean	SD
1. Employees are never too old to learn	9.53	1.27
2. Employees require constant participation in educational programs to remain current	8.76	2.07
3. Employees need to know of technical advances in area of employment	8.43	2.34
4. Employees should participate in adult education classes during the next year	8.38	2.47
5. Technical schools should offer more classes	8.34	2.40
6. Participation in adult education classes strengthens job security	8.27	2.43
7. Jobs are becoming more complex	8.27	2.62
8. Participation in adult education increases job advancement	8.21	2.00
9. Four year colleges should offer more adult education classes	8.11	2.63
10. Employees benefit from adult education classes	8.00	2.48
11. Employees will be rewarded financially for participating	7.97	2.44
12. Classes offered at convenient locations	7.66	2.93
13. More time is needed for interaction at classes	7.47	2.84
14. Employer should pay tuition and fees	7.42	2.84
15. Employees have time to attend classes after working hours	7.41	2.90
16. Classes offered at convenient times	7.40	3.50
17. More time needed for social discussion during class time	7.09	3.02
18. Employees should be provided time off to attend classes	6.73	3.15
19. Local schools should provide more educational programs for adults	6.43	3.13
20. Local schools willing to assist in educating employees	6.34	4.08
21. Know of classes offered by government agencies in community	6.23	4.25

Table 11 (continued)

Rank Order Of Agribusiness Owners/Managers Agreement To Statements Regarding Adult Education In Agriculture By Mean And Standard Deviation

Statement	Mean	SD
22. More one-to-one instruction needed at my place of business	6.19	3.30
23. Know of classes offered by Ohio State University, not part of the extension service	6.12	4.53

Projected Participation In Adult Education In Agriculture

The fourth objective of this study was to determine the number of persons who would participate in adult education programs in agriculture. Table 12 reports that approximately 65 percent of the farmers indicated that they plan to participate in adult agricultural education classes during the coming year. Likewise, approximately 70 percent of the agribusiness owners/mangers indicated that their employees would attend adult education classes if asked by the employer. The approximate percent of the agribusiness owners/managers who stated they would participate during the coming year was 62.

Table 12

Percent of Respondents By Area Willing To Participate In Adult Education Classes During The Coming Year

Respondent	Percent
Farmers	64.8
Agribusiness Employees	70.2
Agribusiness Owners/Managers	62.1

CONCLUSIONS AND/OR RECOMMENDATIONS

Conclusions

The following conclusions about objective one can be made.

1. The majority of the farmers and agribusiness owners/managers have participated in adult education classes in agriculture.
2. The Ohio Cooperative Extension Service is the agency perceived by farmers as the most important agency which should

deliver adult education programs in agriculture to them and that agribusinesses should be the least important.

3. Agribusiness owners/managers reported that Joint Vocational Schools should be the most important purveyor of education for their employees and that high schools should be the least important.

4. Agribusiness owners/managers felt that product line companies such as John Deere and Dekalb should be the most important deliverer of adult education programs in agriculture to them and that high schools should be the least important.

5. Public school teachers do not feel that they should be the purveyors of adult education in agriculture.

6. County extension agents reported that the extension service should be the purveyor of adult education programs in agriculture.

7. High schools most often inquire of agribusiness owners/managers concerning their educational needs.

8. Farmers and agribusiness owners/managers most often participated in adult education programs in agriculture sponsored by agribusinesses and/or product line companies.

The following conclusions about objective two can be formulated.

1. The primary reason that teachers reported for not having adult education programs in agriculture was because the classes were already being offered by other agencies.

2. Other reasons that teachers reported for not having adult education classes programs in agriculture was because they take too much time, there is a lack of enrollment, and the teachers are not paid enough for the services.

The following conclusions about objective three can be drawn.

1. A large majority of the farmers and agribusiness owners/managers have a felt need for adult education programs in agriculture.

2. A need exists because respondents reported they are never too old to learn.

3. Jobs on the farm and at the places of business are becoming more complex.

4. Farmers and agribusiness owners/managers need to be kept up-to-date on new technology.

5. Participation in adult education programs in agriculture was perceived to strengthen job security.

6. Participation in adult education programs in agriculture was perceived to increase job advancement possibilities.

7. Financial rewards were perceived to be gained by those attending adult education programs in agriculture.

8. Farmers and agribusiness employers are willing to pay tuition and fees to attend adult education programs in agriculture.

9. Farmers, agribusiness employees, and agribusiness owners/managers benefit by attending adult education classes in agriculture.

10. Agribusiness owners/managers indicated that most employees need new knowledge and skills in agriculture.

The following conclusions about objective four were drawn from the data collected.

1. The majority of the farmers indicated that they plan to participate in adult education programs in agriculture during the coming year.

2. A large number of agribusiness employees would attend adult education classes in agriculture if asked by the employer.

3. The majority of agribusiness owners/managers stated that they plan to participate in adult education classes in agriculture during the coming year.

Recommendations

1. The Ohio Cooperative Extension Service should serve as coordinator and facilitator of adult education programs in agriculture for the farmers.

2. Joint Vocational Schools should serve as coordinators and facilitators of adult education programs in agriculture for agribusiness employees.

3. Product line companies should serve as the purveyors of the educational needs of agribusiness owners/managers.

4. Product line companies should make a greater effort of soliciting the opinions of the agribusiness owners/managers regarding their educational needs.

5. Farmers are asking that the Ohio Cooperative Extension Service provide their educational needs, yet the farmers are participating in more of the programs offered by the agribusiness. More effort should be placed by the Ohio Cooperative Extension Service to provide programs that are relevant to the farmers' needs.

6. Public schools should offer alternative classes not being offered by other agencies in an effort to establish themselves in providing adult education programs in agriculture.

7. All public education institutions should make an effort to do more in the delivery of adult education programs in agriculture.

8. The Ohio Cooperative Extension Service should bring programs into the communities.

To achieve the portion of the purpose of this study of proposing alternative educational delivery systems, a commission will be formed to recommend guidelines for pilot efforts for the delivery of adult agriculture education. This segment of the total project will hopefully be carried out in the near future.

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ATTITUDES TOWARD COMPETITION IN A YOUTH ORGANIZATION: A CASE STUDY

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INTRODUCTION

During the last two decades, there has been a growing concern about the effects of competition on youth. This concern has been especially meaningful to professionals who work with youth such as those in 4-H and FFA. Competition has always been a large part of many projects and activities at the local, county, state and national levels and this in large part has been due to the fact that adults have generally accepted the fact that youth enjoy participating in activities if they belief they will be successful. They base their belief on prior experiences and the actions of those around them. The National 4-H Awards Task Force (1983) offered some food for thought when they reported:

> Although not always consistent with human development goals, the desire to win is a strong motivator for some people. Contrary to popular belief some people--and particularly some young people--are not motivated by this type of recognition. In fact, these youth are turned off by peer competition and seek other outlets for their activity (National 4-H Awards Task Force, 1983).

Other research on competition has indicated that low achievers will avoid a competitive environment (Kirteeng, 1965; Parker and Johnson, 1981; Billing, 1980). These low achievers, as youth professionals in 4-H and FFA know, may be the individuals who benefit most from opportunities provided by 4-H and FFA.

On the other hand, in a report in the Times Higher Educational Supplement, Prvulovich (1982), in discussing competition, claimed that, "Those who thought they had done badly tried much harder. Those with an 'average' result tried at least as hard the next time." In addition, "it was those who thought they had done well who put less effort into the repeat performance. Far from discouraging the 'losers,' competition would seem to have its most adverse effect upon those who believe themselves to be excelling." Several psychologists have viewed competition as a useful tool for getting children to work up to their potential and have recommended encouraging competition between groups and cooperation within groups.

Significance of the Problem

An October 1983 meeting of the Ohio Extension Research Needs Committee highlighted several topics which called for research. Among those areas needing research were the value of recognition, the rewards system, in addition to incentives and competition. The question: How do these areas affect 4-H participation?

According to research done by Oliveri (1985), nearly two million dollars was spent in Ohio annually by fair boards on cash awards, ribbons, pins, trophies, county fair judges and fair passes for members and volunteers. Another $386,000 was obtained from sponsors and donors for banquets, trips, trophies and other county programs. Four-H committees, scholarships, and the Ohio 4-H Foundation have spent $112,000 each year on other awards.

A study by Kirteeng (1965) indicated that "4-H award winners were more inclined to re-enroll in 4-H." Jeter (1971) and McClure (1971) reported, in separate research, that those members who re-enrolled enjoy competition more than dropouts and had a better attitude toward competition.

Billing (1980), in a study of direct versus indirect competition, said:

> Positive sum conditions (more winners than losers) are highly desirable in an educational context where maximum development of each individual is the goal. Competition is neither inherently good or bad; it is simply one type of human behavior. With respect to education, it is good if it maximizes the acquisition of knowledge and skills; it is bad if it detracts from learning. If maximum development of all students is desired, direct competition (competition against each other), by its very nature, negates this goal by producing a large proportion of losers" (Billing, 1980).

Since one of the most important goals of 4-H as well as FFA has been to provide educational opportunities for youth, consideration should be given to the impact competition has had on the educational process. As Hunt and Corman (1963) pointed out in their article, "The Tormented Generation," "Some gifted people cannot thrive--cannot even endure--highly competitive atmosphere; they need one that is more cooperative or permissive or intimate."

A survey conducted in Oregon involving sixty 4-H agents claimed that agents were evenly divided about the following statement, "4-H needs two different programs, one for participation only and one for participation and competition" (National 4-H Council, 1982).

Many researchers (Scanlan, 1982; Schunk, 1984; Watson, 1983) have proposed that competition can be beneficial and enhance learning if the child, with the help of an adult, sets goals that are challenging, yet attainable. They found that goal setting improved performance, even more than feedback. Scanlan (1982) stressed that the goals set must be realistic.

PURPOSE AND OBJECTIVES

These concerns about competition, in addition to a high 4-H dropout rate in Ohio, led to our study (Collins, 1986). Our goal was to describe and compare attitudes toward competition of current 4-H members versus 4-H dropouts. Comparisons were also done based on preferences toward direct (competition against another) versus indirect (comparison against one's own past performance) competition. Specific research objectives included:

1. To describe the attitudes of current members toward 4-H competition.
2. To describe the attitudes of dropouts toward 4-H competition.
3. To compare the attitudes toward competition of current 4-H members and 4-H dropouts.
4. To describe any differences or similarities between members and dropouts regarding indirect versus direct competition.

Definition of Terms

Attitude: The term as used in this study was the expression of a person, by word or deed, of their reaction toward or feeling about a thing or situation (Hothem, 1968).

Competition: The term as used in this study was the opportunity for 4-H members to compare their achievements in relation to their previous achievement, a standard of excellence, and/or in relation to other 4-H members (National 4-H Awards Task Force, 1983).

Direct Competition: Competition of one person against another. At least one competitor has won an award, top billing, etcetera, for every one who has not.

Dropout: This term referred to those youth between the ages of eight and eighteen who belonged to 4-H at one time, but were not enrolled during the 1985 calendar year.

Indirect Competition: Competition against self-determined goals, present skill and past performance. A benefit of indirect competition has been that there have been more winners than losers.

4-H Member: Youth between the ages of eight (or in the third grade) and nineteen who participated in an organized 4-H club program during the 1985 calendar year (Hothem, 1968).

Limitations of the Study

Limitations affecting the scope of this study were as follows:

1. The population and sample were limited to the accuracy of the county enrollments provided.

Basic Assumptions

The following conditions were assumed to be true for the purposes of this study:

1. That competition is/was a part of 4-H.

2. That factors such as race, socioeconomic status, and geographic location were similar for both the current members and dropouts.

3. That the proportion of dropouts in the sample that have moved were representative of the number in the population that have moved.

PROCEDURES

The nature of this study was a pre-experimental design utilizing a modified static-group comparison and ex-post factor (causal-comparison) analyses, as defined by Campbell and Stanley (1963).

Instrument

In order to obtain a means of comparing attitudes toward competition of 4-H members and 4-H dropouts, a survey instrument was used. The instrument combined an attitude scale developed by Hothem (1968) and an index of the strength of indirect and direct competitive attitudes developed by Billing (1980).

Measurement error was controlled with appropriate procedures for validity and reliability. The questionnaires as used for this study were examined for content validity by a panel of experts. Each panel member made comments and suggestions for changes or deletions and all comments were used when compiling the final draft of the questionnaire.

Conditions of Testing

The questionnaire was pilot tested in Fairfield County, Ohio. Twenty-eight questionnaires were mailed (14 to members, and 14 to dropouts), and 22 were returned. The internal consistency reliability coefficients (Cronbach's alpha) for Part A of the instrument was .84 after nine items were deleted. Part B had a reliability coefficient of .80 after eliminating three items.

The final questionnaire consisted of 25 questions regarding competition, and four demographic questions. Participants were asked to respond to parts A and B of the instrument using a six point, Likert-type scale. The demographic information was completed by filling in their age and years in 4-H, while checking off membership status and gender.

A total of 247 questionnaires (71.8%) were returned out of the 344 questionnaires that were sent (172 to current members and 172 to dropouts). The percentage of current members responding was 79.7 percent and for dropouts was 64 percent. The final usable amount from both current members and dropouts were 73.3 and 59.3 percent respectively for a total usable response rate of 66.3 percent.

Nonresponse error was addressed by double-dipping (Miller and Smith, 1983). A random sample of ten percent of those not responding were contacted by phone. The data secured in this manner were used to statistically compare respondents to nonrespondents to determine if differences existed. A random sample of eight ques-

tions were asked each person, and then statistically compared to responses received from respondents. No significant differences were found between respondents and nonrespondents at the .05 alpha level using a t-test.

Subject Selection

Two populations were identified for this study: (1) those who were members during the 1985 calendar year, and (2) those who had joined 4-H but left before reaching the maximum age guidelines.

Multistage proportionate random sampling was used to determine the samples. The 88 Ohio counties have been divided into five districts, and three counties were randomly selected from each of the five districts.

The county extension 4-H agents in the 15 randomly selected counties were contacted by mail and asked to provide a complete list of 4-H member enrollment for 1984 and 1985 with names and addresses. The 1985 list was used to develop a list (frame) of current members and then compared to the 1984 roster to form a list of dropouts. There were two situations in which the counties were unable to provide the necessary information. In those cases, another county was randomly selected from the appropriate district.

The sample sizes were calculated using Cochran's (1977) formula to adequately control sampling error. Once these sample sizes were obtained, samples from each county were drawn randomly and in proportion to the number of members or dropouts in that county relative to the total populations.

A frame and selection error existed, due to inaccurate enrollment records. Therefore, some respondents were grouped in the wrong membership status by the researcher in the original sample. Data was analyzed according to the respondents' answer to the membership status question.

Data Analysis

Responses to the six point, Likert-type scale were assigned a number from one to six. In Part A, six represented those who were most positive toward competition, with 1 being the most negative toward competition. Six represented those who enjoy direct competition in Part B, and 1 those who prefer indirect competition. The t-test, chi-square test, and analysis of variance tests at a .05 alpha level were used to determine if a significant difference existed between the means of the current members and dropouts in their attitudes toward competition or in their preferences toward direct versus indirect competition.

RESULTS

This section includes a description of the total sample, comparisons of means of various combinations of respondents on the basis of attitudes toward competition and preferences toward direct versus indirect competition.

Description of the Total Sample

As mentioned previously, 228 usable responses were obtained from a sample of 344 identified youth. Of these 228 responses, 126 were current members and 102 were dropouts.

Thirty-four percent of the respondents were male, and 66 percent were female. In Ohio, 43 percent of the 1985 4-H members were male, and 57 percent were female. This information indicates that in this study, males were under-represented and females were over-represented.

Twenty-five percent of the total sample were 8-11 years old, 22.8 percent were 12-13, 17.2 percent were 14-15, 15.8 percent were 16-17, and the remaining 9.2 percent were 18 years old, or older. All age groups were over-represented with the exception of 8-11 year olds when compared to 1985 Ohio 4-H enrollment information.

In reporting tenure in the 4-H program, respondents indicated that 45.6 percent had been in 4-H for one to two years. Twenty-one percent had been members for three to four years; 17 percent were members for five to six years, and 16 percent were in 4-H for seven years or more. These figures also indicated over-representation in these various categories except those in the three to four and five years or more categories when compared to 1985 Ohio 4-H enrollment data.

Description of Respondents Based on Their Attitudes Toward Competition

When the differences of attitudes of current 4-H members versus 4-H dropouts were compared, the dropouts were found to have a significantly more positive attitude toward competition than the members (see Table 1). Both groups tended to have a negative attitude toward competition. Dropouts may have had more positive

Table 1
Attitudes Toward Competition Comparing
4-H Members and Dropouts

Membership Status	f	Mean	S.D.	t
Members	126	2.72	.60	* -2.72
Dropouts	102	2.95	.68	
Total	228	2.83		

*p < .05
Mean based on 6 pt. Likert-type scale where 1 = strong negative attitude toward competition, and 6 = strong positive attitude toward competition.

attitudes because they are now away from the competition, while the members are still involved. Another alternative reason is that adequate competitive situations were not provided for some of these dropouts.

The gender, age, and number of years the respondents were in the 4-H program had no significant effect on their attitudes toward competition, although those who had been members one to two years had the most positive attitude, while those in 4-H for seven years or more had the lowest attitude scores.

Nearly 66 percent of the respondents of this study were female, while the remaining 34 percent were male. Although the differences in attitude of these two groups were found to be nonsignificant, males were more positive toward competition than females.

Age was not found to be significant, although older youth were the most negative toward competition. All age groups were shown to have means less than 3, except males 12-13 (3.01), indicating a more negative than positive attitude toward competition.

When boys of different ages were compared to each other based on their attitudes toward competition, no significant differences were found (see Table 2).

Table 2
Boys' Attitudes Toward 4-H Competition by Age

Age in Years	f	Mean	S.D.
8-11	14	2.73	.50
12-13	25	3.01	.64
14-15	24	2.95	.74
16-17	8	2.95	.38
18 and older	7	2.90	.70

.05 = no significance; Chi-square = .226; df = 4.

No significant differences were identified between girls of differing ages on the basis of their attitudes toward competition. The trend was for attitudes to become more negative toward competition as the girls became older.

A significant difference between members and dropouts was identified in reference toward direct versus indirect competition. Dropouts had a mean that was significantly higher than the mean of the members. Therefore, dropouts preferred direct competition more than members did, although ultimately, both tended to prefer indirect competition (see Table 3).

Females were found to have a significantly higher preference for indirect competition than the males. The mean for males was 3.00, with 2.71 being the mean for females.

When comparing different age groups on their preferences toward direct versus indirect competition, no significant differences were found. Youths 12-13 preferred direct competition the most, followed by 8-11 year olds, then 14-15 year olds, 16-17 year olds, and

Table 3
Attitudes of 4-H Members and Dropouts Toward
Direct Versus Indirect Competition

Membership Status	f	Mean	S.D.	t
Members	126	2.71	.73	* -2.72
Dropouts	102	2.93	.84	
Total	228	2.81		

* $p < .05$
Mean based on 6 pt., Likert-type scale where 1 = strong preference for indirect competition, and 6 = strong preference for direct competition.

finally those youth 18 and older, who preferred indirect competition more strongly than the other age groups.

No significant differences were found when comparing various groups by the number of years they were in 4-H. The tendency was for youth with longer tenure in 4-H to prefer indirect competition.

The comparison of boys of different ages was not found to be significant. Boys 12-13 and 16-17 indicated more of a preference for direct competition, while the younger boys and boys older than 17 more strongly preferred indirect competition.

Females, in general, preferred indirect competition. With the exception of members 12-13 (3.08), all females had means below 3.00. Significant differences were not found between age groups for females.

Relationships between Variables

Combining variables such as gender and age, membership status and gender, membership status and age, in addition to membership status and years in 4-H, was not very enlightening. Combinations involving males and/or dropouts had consistently higher means than other categories.

Using a "Maximum R-Square Improvement for Dependent Variables," various combinations of variables were examined. When part A of the study (attitude toward competition) was viewed as a dependent variable, all combinations of independent variables (gender, age, years in 4-H, and membership status) were found to be significant at the 0.0027 level, with 4 degrees of freedom. The most significant single variable was membership status with a 0.0070 probability (see Table 4).

For Part B of the questionnaire (preference toward direct versus indirect competition) the interaction of all four variables provided a probability of 0.0004. The most significant single variable was gender, with a 0.0069 probability.

A correlation of .63 was found between Part A and Part B of the instrument, which indicated that as the attitude of an individual toward competition became more positive, their preference toward direct competition increased, or as their attitude toward competition became more negative, their preference toward indirect competition increased.

CONCLUSIONS/RECOMMENDATIONS

Several important conclusions were drawn from the results of this study. The following 13 points are listed:

1. Dropouts had a significantly more positive attitude toward 4-H competition than did members.
2. Males had a more positive attitude than females toward competition, although the difference was not significant.
3. No significant differences existed between the different age groups in their attitudes toward competition.
4. The number of years a respondent was in 4-H was not significant in their attitudes toward competition.

Table 4
Maximum R-Square Improvement for the Dependent Variable Attitudes Toward Competition

Model	Variable(s)	R	R-Square	F
Best One Variable	Membership Status	.1780	.0317	7.40*
* $p < .05$				
Best Two Variables	Age Membership Status	.2322	.0539	6.42*
* $p < .05$				
Best Three Variables	Age Gender Membership Status	.2630	.0692	5.55*
* $p < .05$				
Best Four Variables	Years Age Gender Membership Status	.2647	.0701	4.20*
* $p < .05$				

5. As girls got older, their attitudes became more negative toward competition.

6. All groups were more negative than positive toward competition.

7. Indirect competition was preferred significantly more by members than dropouts.

8. Females preferred indirect competition significantly more than males.

9. No significant differences existed with the variable age in preferences toward direct versus indirect competition.

10. Although no significant difference existed between groups based on tenure of the respondents, the longer respondents had been in 4-H, the more they preferred indirect competition.

11. All age groups of boys preferred indirect competition. No significant differences existed between groups.

12. No significant differences existed between girls of different ages. All preferred indirect competition.

13. All groups preferred indirect competition over direct competition.

It is recommended that when the county program or school curriculum is reviewed that we scrutinize the program more closely. Are 4-H/FFA members "strongly encouraged" to compete, or to participate in direct competition? Perhaps members should be allowed to choose if they wish to participate in competition, and what type of competition they prefer. All groups tended to prefer indirect competition in this study.

Do instructors emphasize other aspects of their program or is competition the carrot? Our study does not indicate that competitive experiences should be eliminated from 4-H/FFA. We realize that many youth benefit from, and have a positive attitude toward, competition, but competition is not the answer for all students/members.

Four-H/FFA members should not be pressured to compete, since our study shows that there tended to be negative attitudes toward competition. Youth can become frustrated and give up if forced into competition.

Implications for Further Research

1. Research should be conducted to determine changes in competitive attitudes of 4-H/FFA members before and after a competitive situation. This would help determine if the results of the competition determine the attitude the member adopts toward competition.

2. Research should be done to determine the effectiveness of various recognition systems in 4-H/FFA, to determine the most appropriate one(s). Direct and indirect competitive situations should be compared. (For 4-H, this might include a review of counties who are utilizing the "New Model for Recognizing 4-H'ers" developed by the National 4-H Awards Task Force.)

3. Another study similar to Hothem's (1968) should be conducted to see how parents, advisors, and members' attitudes toward

competition compare in the 4-H/FFA program today. Identification of the source of the competitive push in 4-H/FFA would be helpful in planning future programs.

4. More work should be done relating to the interactions of gender, years in the program, and age of the youth. Perhaps this would be most effective if only members were studied, to get a more straightforward look at the attitudes of members and their preferences relating to competition.

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Paper Critique: Central States Research Conference, 1987
Paper Title: Attitudes Toward Competition in a Youth Organization: A Case Study

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Institution: The Ohio State University
Reviewer: Edgar Persons, University of Minnesota

This study was well grounded in the literature. Not only were the literature citations recent, they were well balanced in support for and arguments against completion. They provided an excellent background in competing concepts on which the study could be built.

The methodology used is appropriate. The sampling plan appeared to be carefully done and the instrumentation subjected to careful scrutiny and statistical verification of its adequacy. While some might question if the reliability levels reported are adequate, they were at least verified and steps taken to adjust items to get a respectable reliability reading.

This paper is very well written. It is precise yet informative. It is organized in a logical way that leads the reader through the paper, step by step - background, literature support, purpose and objectives, procedures, findings and conclusions and recommendations.

The authors were careful throughout the results section to stick to the facts as suggested by the data. Only once did they stray and that time offered only alternative reasons why the results were as shown. They drew no conclusion nor showed bias to one

alternative reason over another.

I find no flaw with either their conclusions or their recommendations with the exception of a minor point I will address later. All of their conclusions are supported by the data in combination with the literature and their recommendations simply suggest ways to implement their findings. But even here, the authors are careful not to make strong recommendations that are not supportable by data. Rather, they suggest the questions implementers should ask themselves and suggest what the answers might be based upon the results of this study.

This is a fine piece of research. While it does not answer conclusively if emphasis on ~~completion~~ competition should be increased or curtailed, it is quite possible there is not a conclusive answer; at least none based on the use of the instruments we have available to discern if competition is good or bad.

Now to some fine points of critique. I am sure that if the authors would have thought about the semantic traps we often fall into, they would have changed the wording slightly to avoid them. I would call attention to result number 5 which states "as girls get older, their attitudes become more negative toward competition." I'm not suggesting that is not true - but it cannot be supported by this study. What can be supported is that "older girls in this study reported more negative attitudes toward competition than the younger girls who responded." There

is a difference. The first statement suggests that we have measured the attitude of young girls and remeasured them as they grew older to discern a change in attitude. Obviously the authors did not do that.

We find the same semantic error in result 10 which states "The longer respondents had been in 4-H, the more they preferred indirect competition." Again, this kind of statement implies a change. While change may occur, this study did not attempt to chart change.

I was disturbed by the title. When we have an excellent piece of research, it should be titled correctly. "Case Study" has specific connotations for most people who hear the term. Even if they have no knowledge of research technique, "Case" has an implied definition. I doubt if any who would read this study without benefit of title would chose to call it a case study. Be proud of what it is! - An excellent example of well defined and well executed survey research activity.

"When the focus of attention is directed towards a single case or a limited number of cases, the process is personalized. The case study is concerned with everything that is significant in the history or development of the case. The purpose is to understand the life cycle, or an important part of the life cycle of an individual unit. The unit may be a person, a family, a group, a social institution or an entire community. The case method

probes deeply, and intensively analyzes interaction between the factors that produce change or growth. It emphasizes the longitudinal or genetic approach, showing development over a period of time." [1]

[1] Best, John W., Research in Education, Prentice Hall, Inc., Englewood Cliffs, N.J. 1959

See also:
Good, Carter V. Essentials of Educational Research, Appleton, Century Crafts, New York, 1966.

INCREASED SECONDARY GRADUATION REQUIREMENTS: THEIR INFLUENCE ON VOCATIONAL AGRICULTURE AND VOCATIONAL EDUCATION PROGRAMS IN WASHINGTON

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INTRODUCTION

Forty-eight states have raised academic requirements for secondary school graduation. This reflects the efforts of those in the excellence movement to reform education while attempting to raise student SAT scores. Critics of the reform movement claim that a return to the basics may emphasize academic preparation for college and may not focus on meeting individual needs of students through vocational education. Increased emphasis on college preparation for all students limits enrollment opportunities for students interested in, or needing, vocational education.

Approximately 50% of the graduates of secondary education attend college or post-secondary vocational institutions. The lack of student opportunity to develop employable skills intensifies when the remaining 50% are denied access to vocational preparation because of additional requirements in mathematics, science, social science, English, and foreign language. As a result, more students may leave high school without diplomas and generally without entry level job skills necessary to obtain gainful and meaningful employment.

The study involved the investigation of the validity of major concerns expressed by Washington State vocational agriculture teachers. Generally, these concerns were in response to declining enrollments, reduction in the number of agriculture classes, and subsequent reassignment of vocational agriculture teachers to teach in areas outside of their specialty. The study also sought to investigate the degree of enrollment changes for each of the nine state-wide vocational program areas. This information gave some perspective as to the net change of numbers of students and their destination within the school system. Through relative comparison, it indicated the condition of vocational agriculture when compared with other vocational programs. Specific enrollment patterns, trends, and influencing factors add to the body of existing knowledge related to declining enrollments.

The Washington State Board of Education instituted increased general high school graduation requirements in July of 1985. Changes were made by manipulating the number of credits required for academic and vocational areas by: 1) redefining the number of instructional hours required to receive one credit, and 2) adjusting the amount of credits required in each subject area. As shown in Table 1, the outcome stipulates an increase of time devoted to academic preparation and a decrease for occupational education and electives (Brouillet, 1985). Credits allotted to subjects prior to July 1, 1985 were multiplied by 60 hours of instruction while credits allotted after July 1, 1985 will be multiplied by 150 hours of instruction. School districts which operated on a seven period day basis were required to extend period lengths to accommodate additional time requirements. This correlates to 153 instructional hours (51 minutes x 180 days) or roughly one credit. One period for one semester of instruction equates to one half credit.

Washington is one of five states that required at least one credit in occupational education for graduation. Thirteen other states recommended that students take at least one course in occupational or vocational education (Cramer, 1984).

Table 1

Comparison of Washington's Secondary Graduation Requirements After July 1 to Requirements Prior to July 1, 1985.

Subjects	New Credit	New Hours	Prior Credit	Prior Hours	Change
English	3	450	6	360	+90
Mathematics	2	300	3	180	+120
Social Studies	2.5	375	5	300	+75
Science	2	300	2	120	+180
Occupational Educ.	1	150	3	180	-30
Physical Education	2	300	6	360	-60
Electives	5.5	825	20	1200	-375
TOTAL	18	2700	45	2700	0

Berry (1985) also indicated that freshman college entrance requirements in 1988 will in addition to the new secondary graduation requirements include one additional credit of English and mathematics, an additional one half credit of social science, and two credits of foreign language. The logical outcome of the increased college entrance standards was that college preparatory students did not enroll in vocational education programs (Parks and Henderson, 1985).

Four major factors strongly influenced student opportunities to enroll in vocational education: 1) increased secondary graduation requirements (Albrecht & Duca, 1983, Dyrenfurth, 1985, Florida ASCD Policy Task Force on Increased Graduation Requirements, 1983, Silberman, 1984), 2) increased college entrance requirements (Berry, 1985, and Parks & Henderson, 1985, 3) additional local secondary requirements (Dyrenfurth, 1985), and in some states, 4) competency testing (Klein 1984, Maher & Thomas, 1982). Increased secondary academic requirements for graduation, in many cases, results in a reduction in course offerings for vocational education or electives (Cleary, Fortune, and Underwood, 1985).

PURPOSE AND OBJECTIVES

The purpose of this study was to address the influence of increased secondary graduation requirements by describing enrollment changes in vocational agriculture, vocational education, and secondary general education in Washington from 1982 through 1984. Specific objectives determined the degree of influence by:

1. Describing enrollment changes in vocational agriculture and vocational education on small and large schools.

2. Comparing student enrollment patterns and trends among vocational agriculture, vocational education, and secondary general education for both unduplicated and duplicated enrollments.

3. Describing enrollment patterns in each of the nine vocational program areas.

PROCEDURES

The population for this study was comprised of 160 Washington school districts that offered vocational agriculture. The State of Washington was divided into four sections to insure equal representation of geographic location and population. The sample consisted of 25% of the total Washington school districts operating vocational agriculture programs grades 9-12 and comprised 40 school districts. The total number of school districts from each section was identified. A stratified random sample was then selected by multiplying total school districts for each section by one fourth. Using a table of random numbers, 25% of the school districts in each section were selected (Minium, 1970). The 40 school districts consisted of 18 small and 22 large districts. Because large districts often possess more than one high school, the sample included 54 individual secondary schools. The data for each individual school district were handled separately. Enrollment data for large school districts having more than one secondary school were summarized by averaging changes in enrollment. This was accomplished by summing the total enrollments and dividing them by the total number of secondary schools in the district. Average

enrollment changes of this type were listed under the category of a large school district. Small schools had secondary enrollments grades 10-12 of equal to or less than 400 and large schools greater than 401 students.

Data were collected from annual vocational enrollment reports submitted to the Washington Superintendent of Public Instruction. Enrollments were listed in terms of unduplicated and duplicated students for each program area in vocational education. Since enrollment information for each school district is subject to audit and provide the basis for vocational funding allocations, the reports were assumed to be valid and reliable. Efforts were made to correct those enrollment reports with incomplete data through telephone communication between the researcher and the vocational or school administrator for that school. Procedures were employed to handle missing data to assure the accuracy of results. School districts with null enrollment data were not included in computations for categories in which missing data existed. General education enrollments were collected from monthly required state reports indicating student enrollments grades K-12. Descriptive data were analyzed with SAS (Statistical Analysis System) and reported in terms of percentage and proportions. Table 2 indicates student enrollment patterns and trends by describing data and summarizing negative and positive changes in enrollment from 1982 through 1984.

RESULTS AND CONCLUSIONS

Data in Table 2, indicate specific enrollment patterns and population trends among vocational agriculture, vocational education, and secondary general education for the sample in total, as well as, the subsamples of small and large schools. In the sample, five changes in enrollment patterns were evident: 1) secondary general education enrollment rose 1772 students or 5.3%, 2) vocational agriculture enrollment decreased by 493 or 10.2%, 3) enrollment in total vocational education programs decreased by 839 or 2.8%, 4) in the net enrollment shifts, vocational education received none of the influx of 1772 new students in general education and, 5) the number of students taking more than one vocational class decreased by 823 or 12.7% in vocational agriculture and by 1564 or 3.8% in total vocational education.

Table 2

Changes in Unduplicated and Duplicated Enrollments in Vocational Agriculture and Vocational Education from 1982 through 1984

Subject	Unduplicated			Duplicated	
	GenEd	Vo-Ag	VocEd	Vo-Ag	VocEd
Sample	+1772	-493	-839	-823	-1564
	+5.3%	-10.2%	-2.8%	-12.7%	-3.8%
Small	+261	-138	+30	-79	-63
	+5.8%	-11.6%	+.81%	-5.2%	-1.3%
Large	+1511	-355	-869	-1501	-744
	+5.2%	-9.7%	-3.3%	-14.9%	-4.1%

Small schools experienced the greatest relative amount of secondary education growth of 5.8% and the greatest relative decrease of 11.6% in unduplicated vocational agriculture enrollments. Small schools experienced a 5.2% decrease in duplicated vocational agriculture enrollments compared to a decrease of 14.9% in large schools. Small school unduplicated vocational education enrollments increased 0.8% compared to a 3.3% decrease in large schools. Small schools experienced a minimal decrease of 1.3% in the number of students duplicating enrollment in vocational education compared to a much larger decrease of 4.1% in large schools.

Table 3 summarizes enrollment changes in each of nine vocational program areas in Washington. When considering the size of student enrollments, vocational agriculture and home and family life were most negatively affected by respective enrollment decreases of 2617 and 5472 in unduplicated and decreases of 1866 and 2539 in duplicated enrollment. Both business and office and vocational industrial arts programs experienced enrollment increases of 3778 and 446 respectively in unduplicated and increases of 2035 and 1471 in duplicated enrollments.

Table 3

Changes in Washington State Vocational Program Enrollments

From 1982 through 1984

Program	Unduplicated		Duplicated	
	Net Change	Percent Change	Net Change	Percent Change
Vo-Ag	-2617	-14.3%	-1866	-8.1%
B&O	+3778	+6.4%	+2035	+2.5%
Marketing	-199	-2.1%	+395	+3.2%
Health	-284	-31.4%	-123	-15.7%
H&FL (Useful)	-5472	-9.7%	-2539	-3.6%
H&FL (Gainful)	-291	-25.1%	-270	-20.4%
Ind. Arts	+446	+4.4%	+1471	+15.7%
Trades & Ind.	-243	-2.1%	+220	+2.0%
Distrib. Occ.	+4	+.1%	+431	+7.9%
Total Voc.	-4878	-2.9%	-246	-.1%
Total GenEd	+16921	+7.3%	-----	-----

The impact of enrollment changes on Washington vocational programs is both evident and disguised. It is evident in that in the aggregate on a statewide basis including all schools, vocational education lost 4878 students while secondary general education increased 16921. The impact on particular vocational education program areas is disguised by the relatively stable duplicated enrollments. Vocational education duplicated enrollments in the statewide aggregate decreased only 246 students or 0.1%.

Between 1982 and 1984, Washington began approving business and office programs in local school districts to receive vocational funding for key boarding. Although not meant to replace non-vocational typing, those students enrolled in key boarding are now counted (per formula) as vocational enrollments. Since total vocational education enrollments decreased 4878 students, a portion of the 2617 vocational agriculture and 5472 home and family life (useful) students that left these programs likely enrolled in general education or in business and office. This phenomena may help explain the increase of 3778 students in Washington Business and Office program area enrollments. There is evidence in the sample to support this assumption. Unduplicated vocational education enrollments in small schools increased by 30 students or 0.8%. This seems plausible because most small schools offer only home and family life (useful), business and office, and vocational agriculture. Given that in small schools, vocational agriculture and home and family life decreased 11.6% and 9.7% respectively, increases in vocational education enrollment must have occurred in

business and office.

It is clear that the influence of the excellence movement and increased academic requirements resulted in 4878 fewer students enrolled in vocational education in 1984 than in 1982. However, stable duplicated enrollments indicate that 4878 fewer students enrolled in nearly the same number of vocational education classes in 1984 as in 1982. This phenomenon indicates that other influences, in addition to increased local, graduation, and college entrance requirements, may contribute to changing enrollment patterns.

IMPLICATIONS AND RECOMMENDATIONS

The following implications and recommendations were developed from the findings and conclusions:

A reduction in vocational agriculture student enrollment followed by a subsequent reduction of vocational agriculture course offerings intensifies the problem of providing a balanced program adequate in scope and sequence.

Additional academic courses required for graduation limits opportunity for non-college bound or one who's formal education terminates with secondary graduation to gain advantage of employable skills learned in vocational education.

Additional academic courses required for college entrance, above and beyond those required for graduation, may attract high achievers away from vocational education thus lowering the quality of vocational programs.

Secondary school students who choose to supplement required courses for high school graduation with elective credits in vocational education will be penalized later upon deciding to enter college if college entrance standards do not make provisions for courses in vocational education.

Requiring two years foreign language for college entrance may force school districts to hire additional foreign language teachers. To maintain their existence, counselors and principals may encourage the non-college bound student to enroll in foreign language thus further lowering enrollments in vocational education. With the current emphasis on academics, foreign language could become a local requirement for graduation.

Secondary graduation requirements were officially increased in Washington subsequent to July 1, 1985. Reaction to the excellence movement, increased secondary graduation and college entrance requirements, along with unidentified factors, have contributed to declining enrollments in vocational agriculture and vocational education. The majority of states recently mandated increased high school graduation requirements. Timely future studies replicated on a state and national level may better portray direct impacts resulting specifically from increasing secondary graduation requirements.

Further studies should identify specific factors that contribute to declining enrollments. These factors may provide a foundation to improve vocational agriculture and vocational education so that the public may perceive education for work as equally important as preparation for college.

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CURRENT STATUS OF WOMEN TEACHERS OF VOCATIONAL AGRICULTURE IN OHIO AND THEIR PERCEPTIONS OF THEIR PLACE IN THE PROFESSION

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INTRODUCTION

With the enactment of Title IX and later Title II of the Educational Amendments, the federal government took decisive action in an attempt to eliminate or at least reduce in some significant way sex bias, stereotyping and discrimination. Many programs have been created to involve women and men in areas that are not traditional for their sex. However, there has been a general tendency for programs to receive less attention in recent years, presumably because of the success of those efforts. In Ohio during the 1970's, there was a steady increase in the number of women teaching vocational agriculture. Over the last few years, however, that number plateaued and even diminished somewhat. Add to that the fact that women have not at this point been involved in any significant way in the professional organizations of teachers of vocational agriculture, and a cause for concern arises.

The initial studies of women vocational agriculture teachers suggests that there was a place for them in the profession (Moore, Kite, & Thomas, 1979; Ries, 1980). Ries (1980) found that the decision of females to pursue the teaching of vocational agriculture was influenced by their perceptions of bias in the profession. Numerous techniques have been identified which are effective in aiding women in countering the effects of bias and stereotyping (Knight, 1980). Two of the major strategies that offer special opportunity for success with women who teach vocational agriculture in Ohio are the use of role models and support groups (Kane, 1978; Knight, 1980). In the preparation of teachers of vocational agriculture who are female, special attention must be given to these two strategies. The most appropriate source for both come from the ranks of those women who are currently teaching. However, without an understanding of where the women who teach are in terms of their status and experience, it will be difficult to provide the kind of role models and support that undergraduates or the teachers themselves will need.

PURPOSE AND OBJECTIVES

What is the current status of women who teach vocational agriculture in Ohio, and what are their perceptions of their place in the profession?

In order to find a solution to the major concern, answers were sought to the following questions:

1. According to women teachers of vocational agriculture in Ohio, what is their status regarding the following factors:

a. Experience as a student of vocational agriculture and as a member of FFA and 4-H.

b. Method of preparation to be a teacher of vocational agriculture.

c. Years of teaching vocational agriculture.

d. Time commitments to teaching beyond the contractual working week.

e. Marital status.

f. Number of children.

g. Income level

h. Current location of residence in relation to homes where the teacher and spouse grew up.

i. Participation in professional and other organizations.

2. How do women teachers of vocational agriculture in Ohio describe their experiences regarding the following factors:

a. How they learned about and obtained their current position.

b. Work activity commitments during a typical week.

c. Sexual discrimination and harassment.

d. Personal and professional difficulties.

3. How do women teachers of vocational agriculture in Ohio describe the following:

a. Their personal, professional and academic goals for the next five years.

b. Their perception of what can be done to make the teaching of vocational agriculture more rewarding for women.

PROCEDURES

This was a descriptive study of the women teachers of vocational agriculture in Ohio. Since there were only 43 women teachers, it was determined to include all in the study. The questionnaire which was developed and utilized in this study was reviewed by a panel of experts and field tested. The instrument was adjusted based upon the results of that effort and then used to gather the data. The data analysis includes the basic descriptive statistics but no inferential statistics since the entire population was included in the study.

RESULTS

Thirty-eight (88%) of the 43 women who teach vocational agriculture in Ohio responded to the questionnaire. The five non respondents chose not to participate even after two follow up attempts. Following are some of the basic findings of the study regarding the status of those who responded. The results will be presented by objective.

Objective 1: Status on Selected Factors

1. Seventy-two percent had no experience as a student of vocational agriculture, and 46% had no experience in 4-H.

2. The teachers had an average of four years of agriculture work experience, and 56% become teachers through the regular certification route.

3. Fifty-one percent had taught five years or less, and most reported spending four and five hours per week in supervision of occupational experience programs and FFA activities respectively.

4. Fifty-four percent were married and earned an average of $21,611 annually. For those who were married, the most frequently reported distance they lived from the home where their spouse grew up was 1 mile. Sixty-four percent reported having no children, 18% have one child, and 13% have two children.

5. About 60% were members of the Ohio Vocational Agriculture Teachers Association, and 50% belong to the Ohio Education Association.

Objective 2: Experiences

1. Eighty-one percent learned of the opening for their current position through the traditional methods of a school announcement, university contact or a state supervisor contact, and 83% went through a rather traditional interview process.

2. All responded that they performed the traditional activities of teachers of vocational agriculture, and many complained about the time commitments and the amount of paperwork required.

3. Thirty-one percent reported that they had been discriminated against at some point in their career, and 29% reported as having been harassed. Generally, the examples given about discrimination related to hiring practices to which they had been exposed. Harassment examples given by the respondents generally centered around sexual innuendo.

4. Forty-three percent expressed the traditional difficulties generally reported in the literature by other teachers of vocational agriculture such as trouble with administrators, low enrollments, unmotivated students, low salary and lack of time to meet all the demands of teaching vocational agriculture. However, 36% reported such concerns as not being taken seriously, feeling excluded and balancing household

chores with the professional demands. An additional 9% expressed concern about living up to the "good" vocational agriculture teacher image.

Objective 3: Goals and Needed Support

1. Goals:

   a. In terms of professional goals, 60% reported that they would like to continue to teach and improve their programs during the next five years. Twenty-eight percent would like to move into administration, supervision or advance within their current position or profession. Ten percent want to leave vocational agriculture.

   b. In terms of academic goals, sixty-seven percent want to obtain an advanced degree. An additional 21% specifically want either a degree or certificate in another area of teaching.

   c. In terms of personal goals, 68% expressed goals related to family concerns such as getting married, having children and improving their home. Nineteen percent reported a desire to travel or do other things for self fulfillment.

2. Eighty-one percent expressed a need for support and encouragement from family, colleagues, administrators and leaders. Generally, comments were centered around the need for simple "words of encouragement" from others. In addition, 81% expressed the desire to have an annual meeting just for women teachers of vocational agriculture.

CONCLUSIONS AND RECOMMENDATIONS

As might be expected, women teachers of vocational agriculture generally reported little or no experience as students of vocational agriculture or as FFA members. They appear to spend time much as male vocational agriculture teachers as reported in other studies. Since most have taught less than five years, they tend to be a relatively young group of people with just over half being married. About 60% are members of the OVATA, but one-half belong to the Ohio Education Association and the parent organization, the National Education Association (NEA).

Nearly all women teachers of vocational agriculture learned about and procured their teaching position through the normal methods. Many, 31% and 29% respectively, reported experience with sexual discrimination and harassment. In this day and age, these kinds of numbers give cause for concern. Many (43%) expressed the traditional concerns faced by all vocational agriculture, but over one-third added concerns that appear to be somewhat unique to women teachers.

Many (60%) want to continue in the profession for the next five years, and about one-third (28%) want to pursue administration or supervision. One-tenth simply want to leave the profession. Nearly all are

interested in pursuing advanced education either in agricultural education or other areas of study. From a personal standpoint, slightly over two-thirds have goals related to marriage and family.

Nearly all expressed a need for encouragement for their work as teachers of vocational agriculture. One way of meeting this need is through support groups and networks. This probably explains, to a large degree, the strong desire of the respondents to have an annual meeting just for women teachers of vocational agriculture.

Based upon the findings of this study and the related literature, it would appear that in Ohio it will be important to provide some sort of special support for women who teach vocational agriculture. It appears that if they are to remain in the profession, be successful, serve as role models for undergraduates and become or remain professionally active, it will generally be important to make overt efforts to assist them. Some of the areas needing assistance are the very traditional concerns of all teachers of vocational agriculture such as time commitments and paper work. However, there appears to be some unique areas which trouble the women teachers more such as coping with stereotypes, harassment and greater household responsibilities. This assistance can and should come from families, administrators, other teachers, the teachers' organization, the state staff and teacher education alike. It is clear that more women can and need to be involved in the teaching of vocational agriculture, and this study affirms the need to offer overt and active support for them.

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REACTOR PAPER

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Dr. Moore chose an interesting theme for this section - Trends, Issues and Challenges. Before reading the papers the designated theme hinted at these being unrelated papers and that was the case. The three papers and their authors are:

Increased Secondary Graduation Requirements: Their Influence on Vocational Agriculture and Vocational Education Programs in Washington
--Jerry Simon, University of Minnesota
--Marvin D. Kleene, Washington State University

Current Status of Women Teachers of Vocational Agriculture in Ohio and Their Perceptions of Their Place in the Profession
--James A. Knight, The Ohio State University

Impact of the Minority Apprenticeship Program Experience on Selection of a Major Preference in the College of Agriculture and Natural Resources by Minority Freshmen at Michigan State University
--Donald Wallace, Michigan State University

In some sense Dr. Reneau and I have the task of making a silk purse. Our raw material may not be a sows ear, but more aptly may be baling wire and binder twine.

I plan to offer my comments in the following manner. First, some comments about the papers generally will be offered and then a few comments about each paper.

My expectations may be too high but my personal value about the papers is if these are the best of our profession, the role models so to speak, then we need to make some changes in our profession. I liken a regional research conference to a county fair. It is a show case for our best local efforts and it may be the first time the idea is on public display. But we leave home the average and less than average specimens.

The papers are not guided by theory yet in 2 of 3 cases theory goes begging. A theoretical construct simply guides a study. It helps you cast the problem, helps identify the questions to ask and helps interpret the results.

The papers do not make clear that research is one type of inquiry and evaluation is another. The distinctions here are blurred at best. There are powerful evaluation models available to researchers that would give more insight into the questions being raised than do research models. I will comment on one such approach in the second part of these remarks.

Two of the papers are not carefully written. All of us make mistakes in grammar from time to time but my concern goes beyond that. I will not

embarrass any of my colleagues by quoting a sentence or two here, but I only want to urge writers to always put their best effort before us.

Now let me offer a few reactions to each paper specifically.

The Simon and Kleene paper is about an important topic - increased graduation requirements. It starts out as an exciting, interesting topic but runs out of motion going downhill. The introduction promises far more than the paper delivers. In the introduction the writers display a good grasp of trends and issues affecting graduation requirements. That information is never heard from again, unfortunately in my opinion. They cite the fact that many vocational students go on to college, the critical nature of employability skills for selected students, change in the work force, changes in technology, and a little about the nature of schooling. In discussing the role of vocational education in its larger educational context it is noted that "vocational education is designed to complement general education and serve as a vehicle to prepare students to: 1) learn general work skills and knowledge for entry employment, 2) plan for work through career exploration, 3) learn to learn, 4) solve problems through critical thinking, and 5) develop a range of applicable and transferable technical employment skills" but do not utilize these later in understanding the findings of the study. If these objectives are the core of schooling, couldn't they be a backdrop to interpret the changes in program enrollments?

The study is flawed in its basic logic as I understand its purposes and objectives. The researchers desired to understand the influence of increased graduation requirements by describing enrollment changes in vocational agriculture, vocational education, and secondary general education. The changes in graduation requirements were reported to be effective in July, 1985. The researchers chose to look at data from the years 1982 through 1984. It is not at all clear to the reader how one studied the impact of a policy change with specific data 3 years before the policy was operative.

One finds an occasional sentence that needs clarification. Paragraph four on page 1 begins with just such a sentence which is "Until Sputnik, and again in the 1980s, the need for opportunity within the curriculum and alternate methods of delivering knowledge to students has withstood several philosophical changes and curriculum modifications."

The Knight piece is interesting and certainly deals with an important issue. My reaction is that Professor Knight deals with a serious problem rather superficially. One wonders why no theoretical framework was employed, for example. The area of gender research has advanced significantly since Knight did his original work. Those models and frameworks are ignored. Also several very well established sociological frameworks are available. The career pattern framework comes to mind quickly as a way of seeing how these careers differ from others. Job satisfaction is another whole area that might be helpful.

There is no normative basis to the study. Therefore, one finds it difficult to interpret and apply meaning to the data. It is nice to know, for example, that 60% of the population reported that they would like to continue to teach and improve their programs during the next five years. But how is the reader supposed to understand that information? How does it compare to all agriculture teachers with a comparable level of experience? The

researcher apparently felt the need for such a mechanism as the conclusions and recommendations make reference to data which is not a part of this study.

The Wallace paper also deals with a timely as well as critical issue -- one of recruiting minorities into agricultural careers. The case for concern may be over generalized a bit. It was stated, for example, that "minorities have not been involved in agriculture at any level." Minorities have been involved in agriculture but primarily as low level grunt and stoop laborers. The real problem is to get minorities into an education stream that includes post-secondary training and eventually agricultural careers in mid and higher level occupations.

The study is really an evaluation of the minority apprenticeship program (MAP). It would yield far greater insight into the programs effectiveness had an evaluation framework such as Stuffelbeam's CIPP model been employed.

No data are provided so it is difficult to connect the ideas in ways different from those of the researcher. One thing is clear. The findings are exactly what one would predict from an understanding of attribution theory. While the two groups were nearly identical they differ significantly in that one was chosen to be the MPA group and the other the alternate. Significant numbers of the participants went on to enroll in an agricultural major. The alternates did not. The simple fact that they were not chosen so biased the study that results are meaningless. The whole results section, it seems to me, is vacuous. Equally plausible to the results reported here is that not choosing people for a program like MPA is a sure way to enforce the idea the agriculture does not have a future for minorities. My judgment is that the MAP program is a powerful educational tool, but its real effectiveness is not discerned by this study.

All three studies were timely and important. All were cast in very large terms while the objectives were narrow and specific. The result is that all promise more than they deliver. The objectives were clear and generally the procedures were clear. Since the topics and procedures did not justify complex statistical procedures and none were used, I want to say a job well done.

Dr. Moore said these papers represented "Trends, Issues & Challenges." I agree. All three discuss important trends and issues. Also, all three of the studies could benefit from more care in selecting the approach or design. That's my challenge to the researchers of these papers.

A FOLLOW-UP EVALUATION OF A FRUIT AND VEGETABLE INSERVICE PROGRAM FOR VOCATIONAL AGRICULTURE TEACHERS

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A Follow-up Evaluation of a Fruit and Vegetable Inservice Program for Vocational Agriculture Teachers

Effectiveness of teacher inservice is of concern to those who plan, attend and pay for inservice programs. Neil (1985) found that 75% of teachers categorized inservice education experiences as "fair to bad." Often there is a problem with transfer of training to classroom practice (Showers, 1985). The major question is - do teacher inservice programs make a difference in what and how instructors teach?

There may be questions about the efficacy of inservice programs, but there is general agreement that some kind of inservice education is necessary. Staying current is a continuing concern of agricultural educators. In a national survey identifying critical issues in vocational education, keeping technologically current ranked third (Zellner & Parrish, 1986). The Agricultural Education Magazine devoted eleven issues in 1986 to articles on keeping up-to-date in technical areas and teaching techniques (Bowen, 1986).

Korinek et al (1985) gave reasons why inservice education for teachers is so necessary. First, college training simply provides the base; further training and experience is vital to good instruction. Secondly, teaching strategies should change as new tactics are developed. To these two reasons, agricultural instructors add a third, a need for inservice education because their field of expertise, agriculture, is so rapidly changing.

Granted that inservice education is necessary - what can be done to make it effective? Studies of inservice education for teachers have attempted to identify the characteristics of effective inservice programs. Burrello and Orbaugh (1982) have identified some common characteristics of effective inservice programs. Inservice programs which make a difference in teacher practices are grounded in the needs of the participants, responsive to changing needs and represent a collaborative effort by various groups.

Inservice programs which fail do so because of five major reasons according to Neil (1986): (1) oversimplification, (2) ambiguities in the school setting, (3) lack of teacher commitment, (4) planning by universities without teacher input into when, where and what and (5) absence of evaluation. Evaluation of inservice education appears to be an important but largely unfulfilled area for scholarly research.

It can be difficult to measure the impact of an inservice program - objectives may be broad, changes may be slight, follow-up may be difficult. A fruit/vegetable inservice program at Iowa State University (ISU) had characteristics that facilitated a follow-up measurement of its effectiveness - specific focus on a topic with potential for attracting non-traditional students and materials designed to aid in developing new instructional units.

The inservice topic, fruit/vegetable production and marketing, was chosen because of the interest in Iowa in diversified agriculture. Recent declines in values for traditional crops and subsequent problems on the farm have led to increased interest in developing alternative crop production enterprises in Iowa. Among the more promising crops which have been identified as potential alternatives for corn and soybeans are fresh vegetables and fruits.

An inservice program on fruits and vegetables for vocational agriculture instructors had the potential for encouraging more horticultural semester courses. Single topic semester courses might appeal to non-traditional students, i.e. girls and non-rural students, and thereby increase total enrollment in vocational agriculture.

SOE and adult programs might benefit from instructor attendance at the fruit/vegetable inservice program. Vocational agriculture instructors are frequently consulted by farm managers and others as they assess available production alternatives. Teacher access to sound technical information related to production and marketing of horticultural crops is critical (Rallis & Bucci, 1981).

OBJECTIVES

The major purpose of the study was to assess the effect of inservice education on curricula change. Specific objectives were:

1. To determine if there was a difference in implementation of fruit/vegetable instruction into the curriculum between instructors who attended a one-day horticulture inservice program and instructors who did not attend.

2. To determine if there was a difference in demographic characteristics between instructors who attended the inservice program and those who did not.

3. To identify the reasons why instructors did not implement instruction in fruits/vegetables.

METHODS AND PROCEDURES

A follow-up study of curricula implementation was done the spring of the academic year (1985-86) following the fruit/vegetable inservice program held the preceding summer. A questionnaire was sent to a sample of those who attended the program and those who did not attend the program, asking them about their instruction related to fruits/vegetables.

Population. The population upon which this study was based included 365 high school and post-secondary vocational agriculture teachers in Iowa during the 1985-86 school year. Of these teachers, 269 were high school vocational agriculture instructors and 96 were teaching at the post-secondary level.

Treatment. One-hundred sixty-nine instructors chose to attend the fruit/vegetable horticulture inservice program held June 20, 1985, at the Iowa State University Horticulture Farm. The one day workshop included presentations and a number of stops at demonstration plots around the horticulture farm. Horticulture professors and Extension specialists stationed at each demonstration plot explained cultivation and propagation of the fruit or vegetable grown there and answered questions from the instructors. Presentations by local growers and an economist emphasized marketing importance and procedures for effective marketing.

Each instructor received a comprehensive notebook containing detailed lesson plans and supplementary materials which would aid in teaching fruit/vegetable units. The notebook (ICAS, 1985) was developed by the Horticulture Department and the Department of Agricultural Education at ISU under a grant from the Department of Education. The following fruit and vegetable crops were covered: raspberry, strawberry, cole crops, potato, sweet corn, tomato, and vine crops. Transparencies and slides were included in the instructional materials received by each teacher.

Sample. For purposes of the study, the population was divided into (Group I) those who had chosen to attend the fruit/vegetable inservice program at the ISU Horticulture Farm the previous summer and (Group II) those who had chosen not to attend. Samples of the teachers representing each group were randomly drawn, resulting in sample sizes of 63 for Group I and 52 for Group II. The composite sample consisted of 115 teachers.

Questionnaire Validity. A questionnaire was designed to determine whether and to what extent teachers had implemented horticulture units which included fruit/vegetable production and marketing into their instructional program. The questionnaire assessed demographic characteristics of teachers and schools in which they taught. The questionnaire was tested for validity with instructors who were not a part of the sample group.

Return Rate. Fifty-one of the sixty-three people who had attended the summer fruit/vegetable inservice program returned the questionnaire for a response rate of 81%. Forty of the fifty-two person sample of those who had not attended the inservice program returned the questionnaire for a response rate of 77%. Overall response rate to the questionnaire was 79%. This response rate was achieved after two contacts by mail. Because the response rate was acceptable for a specialized population (Dillman, 1978), no further follow-up of non-respondents was conducted.

Analyses. The Chi-square Test of Independence was used to test for an association between characteristics of the two sample groups, attendees and non-attendees. Frequencies and the independent t-test were used to analyze selected demographic data. The t-test was used to test for differences in selected variables even though the two groups self-selected themselves by their attendance or non-attendance at the inservice. According to Hinkle (1979), such analyses can be used if inferences are extended to other populations on a logical rather than a statistical base.

FINDINGS

The objective of the study was to determine if there were differences in curriculum implementation between vocational agriculture instructors who attended the fruit/vegetable inservice and those who did not attend.

Differences in Curricula. Of those teachers who attended the inservice, 43% taught fruits and vegetables as part of a horticulture unit during the subsequent school year (Table 1). Twenty percent of teachers who did not attend the inservice taught fruits and vegetables during the same time period. This difference was significant at the .05 level.

Eighteen percent of the attendees taught fruits and vegetables for the first time in the academic year after the inservice compared to three percent of the non-attendees. This difference was significant at the .05 level. Fourteen percent of the inservice attendees instigated a new program related to fruits/vegetables (e.g. vegetables in a land laboratory) compared to seven percent of the non-attendees (Table 1). This difference was not significant. Teachers who attended the inservice reported significantly more ($p < .05$) student Supervised Occupational Experience (SOE) projects related to fruits/vegetables than did teachers who did not attend the inservice.

Differences in Attendance at Previous Inservices. Of teachers who attended the fruit/vegetable inservice, 53% had attended prior fruit/vegetable training sessions. Twenty percent of inservice non-attendees had previously attended fruit/vegetable training sessions. This difference was significant at the .01 level.

Reasons for Not Teaching Fruits/Vegetables. Teachers who chose not to teach fruits and vegetables as part of a horticulture unit were asked to identify from a list those reasons which applied specifically to their situation. Attendees and non-attendees ranked the first two reasons in the same order (Table 3). They were in agreement that: (1) other topics deserved higher priority, and (2) the teacher was not knowledgeable enough to teach the subject. Non-attendees at the fruit/vegetable inservice listed a lack of relevant instructional materials as a major contributing factor in their decision to not teach the unit, whereas inservice participants did not generally perceive this to be a problem. Teacher perceptions that fruits and vegetables are irrelevant ranked last in importance with both groups of teachers.

Teachers who attended the inservice expressed more frequent intentions to include fruits/vegetables in future instruction than did teachers who were non-attendees. Teachers with plans to implement units which would include fruits/vegetables said they required additional lead time for planning and preparation of the new unit.

Comparison of Demographic Factors. No significant differences were found between teachers who attended the fruit/vegetable inservice and those who did not participate when the following factors were compared: school greenhouse, number of students, number of non-traditional

students, number of horticulture classes taken as an undergraduate, years of teaching experience.

There were no significant differences between the two groups in teaching horticulture units without fruits and vegetables. The significant difference occurred in teaching fruits/vegetables, the topic which was the focus of the inservice.

CONCLUSIONS AND IMPLICATIONS

The question "Does inservice make a difference?" is of concern to many (Neil, 1985). This study assessed the effect of a fruit/vegetable inservice program on curricula change during the following academic year. The follow-up study of the 1985 Iowa horticulture inservice program for high school and post-secondary agriculture instructors indicated that the inservice program appeared to make a difference in curricula offerings.

Instructors who attended the inservice program implemented significantly more ($p<.05$) new instruction in fruits/vegetables during the academic year following the inservice than did those who did not attend the program. Participants tended to include instruction about fruits and vegetables in the horticulture units which they taught. Teachers who did not participate in the inservice program generally did not teach about fruits and vegetables.

Attendance at this particular horticulture inservice program was highly associated with attendance at other horticulture training sessions, while nonparticipants tended to refrain from participation in these and similar teacher learning activities. Additional research is needed on differences between instructors who attend inservice programs and those who do not. A study is needed to determine reasons for non-attendance at inservice programs and alternative strategies for reaching those who choose not to attend.

Teachers who attended the horticulture inservice program promoted fruit/vegetable Supervised Occupational Experience (SOE) programs with their students, whereas nonparticipating teachers generally did not. Attendees implemented more new activities than did non-attendees, but the difference was not significant.

Vocational agriculture teachers who attended the fruit/vegetable inservice program and those who did not participate in the inservice program were similar for nearly all of the other characteristics which were measured (Table 2). They taught in similar facilities, had comparable years of experience, had similar educational background in horticulture and numbers of students in the program were similar. Both groups based decisions not to teach fruit/vegetable units based on higher priority of other topics and limited knowledge of topic. Non-attendees listed lack of materials as a reason.

It would appear that participation/nonparticipation by teachers in the fruit/vegetable inservice program was related to implementation of fruit and vegetable units in vocational agriculture programs. Additional inservice activities are recommended as teachers and university personnel

orchestrate implementation of fruit/vegetable units into local programs of study. Results from this follow-up evaluation suggest that inservice programs can make a difference. Those who plan, attend and pay for inservice activities should carefully orchestrate the educational process to ensure transfer of training to classroom practices.

Table 1. Frequencies, percentages, and X^2-values for attendees and non-attendees by characteristics related to horticulture.

Characteristics	Non-Attendees N=40	Attendees N=51	Value X^2	Prob.
Taught fruits and vegetables this year as part of a horticulture unit	8(20%)	22(43%)	4.434*	.035
Taught a fruit/vegetable unit this year for the first time	1(3%)	9(18%)	3.824*	.050
Instigated a new program (e.g. land lab) related to fruits/vegetables	3(8%)	7(14%)	0.260	.610
Taught a unit on horticulture this year which did not include fruits/vegetables	8(20%)	10(20%)	0.048	.827
Have a greenhouse for vo-ag use	8(20%)	10(20%)	0.048	.827
Have students with SOE programs related to fruits/vegetables	18(45%)	36(71%)	5.069*	.024
Number of teachers who took horticulture classes as an undergraduate	24(60%)	28(55%)	0.075	.784
Number of teachers who have attended fruit/vegetable training sessions	8(20%)	27(53%)	8.933**	.010

*Significant at the .05 level
**Significant at the .01 level

Table 2. Means, standard deviation, and t-values for attendees and non-attendees by demographic characteristics of secondary teachers and students.

Characteristic	Non-Attendees N=39 Mean SD	Attendees N=48 Mean SD	t-value	Prob.
Years of vo-ag teaching experience	9.18 9.36	9.85 8.42	-.355	.724
Number of secondary vo-ag students	43.67 18.61	39.19 23.47	.993	.676
Number of non-farm, non-traditional secondary students	17.15 14.55	14.79 16.32	.713	.515

Table 3. Reason why teachers did not teach units which included fruits/vegetables

	Non-Attendees N=40	Attendees N=51
Other topics deserved higher priority	16(40%)	10(20%)
Teacher not knowledgeable enough to teach the subject	13(33%)	8(16%)
Relevant instructional materials were not available	12(30%)	2(4%)
Fruits/vegetables not perceived to be relevant	4(10%)	2(4%)
Plan to teach this unit next year	6(15%)	17(33%)

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SAFETY ASSESSMENT OF NORTH DAKOTA HIGH SCHOOL VOCATIONAL AGRICULTURE MECHANICS PROGRAMS

by

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SAFETY ASSESSMENT OF NORTH DAKOTA HIGH SCHOOL VOCATIONAL AGRICULTURE MECHANICS PROGRAMS

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INTRODUCTION

Agricultural mechanics is an important part of Vocational Agriculture instruction. Units typically taught include: carpentry, welding, agricultural machinery, tractor maintenance, and electricity. There are many hazards involved in agricultural mechanics instruction.

Students are exposed to potentially dangerous situations when operating various machines found in the agricultural mechanics laboratories. Students may be injured due to the lack of: safety equipment; appropriately enforced policies such as the use of eye protection; supervision; industrial quality eye protection; and hearing protection, steel-toed shoes, hard hats, and proper ventilation systems.

Students may receive physical injury from machines which are not properly maintained or are excessively worn and in need of replacement. Hazards involved in the agricultural mechanics laboratory may include: harmful light rays; burns from hot metal; explosions and fires from welding; mechanical injuries from power saws, grinders, jointers, turning lathes, and other machines; toxic fumes from welding or painting; noise levels which could damage hearing; and electrical shock or electrocution.

Teacher educators and the Cooperative Extension Service have been helping to meet the need for increasing safety skills and understanding by preparing teaching materials and offering short courses for teachers of Vocational Agriculture. Additional organized training sessions in safety management could be developed as a result of this study.

Significance and Need for the Study

There is increasing concern about the duties and responsibilities of educators. According to state and federal laws, teachers are legally responsible for the safety of their students. Teachers are, therefore, exposed to the hazards of possible lawsuits. An understanding of the instructors' policies, practices, and needs will assist those in charge of program planning to better meet the needs of instructors and students (Daniels, 1980).

Little research had been conducted in North Dakota on improvements needed by instructors of agricultural mechanics with regard to safety. Without a clear understanding of skills, practices, and policies, it is difficult to assist instructors and improve safety conditions in an effective manner.

Review of Related Literature

Concern for safety is morally, professionally, and legally based. It is a professional responsibility of every Vocational Agriculture teacher. Personal injury or death, especially when caused by carelessness or negligence, severely damages the reputation of teachers, schools, and Vocational Agriculture programs in general (Daniels, 1980). Reliable and up-to-date information is needed to plan educational programs which prepare and upgrade teachers for the safety aspects of the agricultural mechanics field.

Various studies have been conducted concerning safety instruction, safety policies, and safety of facilities in several states. The major purpose of these studies seemed to be determining problem areas and remedying or improving these areas. According to Howard (1982), agricultural mechanics programs can be evaluated with three criteria: teaching methods, facilities and equipment, and student skill. At the top of his list of student skills is 'safe working practices'.

Lee (1980) identitied the essential responsibilities of teachers in safety as: organizing laboratories in a safe manner; providing proper safety equipment; providing for appropriate protective clothing; providing instruction in safety and the proper operation of equipment, use of chemicals, and other activities; keeping all equipment in safe working order; inspecting tools and equipment and replacing worn or damaged parts; and setting a good example.

Bear (1981) suggested a policy for safety that included: always being in the instructional area, permitting only qualified students to use the facilities, purchasing and using only quality tools and equipment, knowing how to use the tools, providing supervision, and requiring personal protective equipment. Bear (1980) also found that one of five accidents with electricity is fatal and states that a safety device called the Ground Fault Circuit Interrupter (GFCI) should be installed if ground fault current protection is needed.

Hoerner and Bekkum (1980) noted while visiting high school Vocational Agriculture departments that the proper type of eye protection was not being used. Many states have laws which regulate the wearing of proper eye protection in shop courses. Unfortunately, many teachers did not require students to wear eye protection while working in the agricultural mechanics laboratory. Weinstein (1981) asserted that more than half of all agricultural eye injuries over the past few years involved chemicals. Ninety percent of eye injuries could have been prevented with the use of proper protective eyewear and safety precautions.

The need for a safe and healthful environment is a primary concern for the instructor and school administrators because of the health hazards formed by fumes and gases. Jacobs (1980) identified ventilation needs, classes of gases, and the systems of ventilation. Providing adequate ventilation for exhaust fumes and gases is a complex problem. Students as well as instructors, however, must be protected from these hazards. A study of recommendations by the National Occupational Safety

and Health Administration or other safety promoting agencies would be helpful in this regard (Jacobs, 1980).

Forsythe (1983) assessed agricultural mechanics safety instruction conducted in agricultural teacher education programs across the United States. Overall, teacher educators believed their students were competent in safety; however, they believed that many graduated with insufficient preparation in the area of first aid instruction. In a study conducted to provide data about noise levels, a potential health hazard for students and instructors involved in Vocational Agriculture shop operations in Missouri, the grinder and radial arm saw were identified as potential noise problems when run continuously for 15 minutes or longer (Weston & Stewart, 1980).

According to Reynolds (1980), an adequate safety program requires more than the development of knowledge and skills involved with machine operation and shop activities. It also requires the development and maintenance of a 'safety attitude'. Students must be made aware their 'frame of mind' can affect their safety and that of their classmates.

PURPOSE AND OBJECTIVES

The primary purpose of this research was to assess safety in North Dakota agricultural mechanics programs in terms of instructor competencies, practices and policies, and facilities. Another purpose was to determine perceived improvement needed in teacher safety competencies. Specific objectives of the study were:

1. To determine the perceived importance of selected instructor safety knowledge and abilities.

2. To determine whether the perceived importance of instructor safety knowledge/ability differed based on length of teaching experience.

3. To determine the perceived level of improvement needed by instructors in selected areas of their own safety knowledge and ability.

4. To determine whether the perceived levels of improvement needed in knowledge/ability differed based on length of teaching experience.

5. To determine the extent to which selected safety practices and policies were carried out in agricultural mechanics programs.

6. To determine safety levels of selected factors regarding facilities and equipment in agricultural mechanics programs.

PROCEDURES

The population of this study consisted of all high school Vocational Agriculture instructors in North Dakota who had taught Vocational Agri-

culture for at least one year. The questionnaire was developed after studying numerous instruments used by other individuals who had conducted similar types of studies. After validation by a panel of experts, it was pilot tested by four high school Vocational Agriculture instructors in northwestern Minnesota. The survey was administered at the All-Service Vocational Conference held in Bismarck, ND, in August of 1985. Five instructors who did not attend were contacted by mail. A 100% response was obtained.

Data from the surveys were summarized and tabulated. Population breakdown, liability insurance, and accident data were tabulated by frequencies and percentages. Percentages were calculated for each item concerning instructor knowledge and ability, safety practices and policies, and facilities and equipment. These statistics were determined for each item for the total group and for the two sub-groups based on years of teaching experience, instructor knowledge and ability, importance, and improvement needed. No other statistical analysis was used for comparison because the total population was surveyed and the response rate was 100%.

RESULTS

Background Data of Respondents

The two tenure groups were those instructors having taught one to five years (45%) and those who had taught six or more years (55%). Most instructors (85%) had liability insurance locally or through their professional organization; however, 12 teachers (15%) reported having no liability insurance coverage. Approximately 75% of the teachers reported no accidents while 18 teachers (22%) noted minor cuts, burns, or scratches. There were two accidents requiring hospitalization.

Importance Ratings by Entire Group

Twelve items were identified as factors which might be important to the instructors' own levels of safety knowledge and ability. The instructors were asked to rate each of the selected factors as: essential, important, somewhat important, or not important. Percentages were calculated for each item regarding instructor knowledge and ability. These percentages were determined for each item for the total group and for the two sub-groups according to years of teaching experience.

All 12 items were rated as important or essential by 85% or more of the instructors. Eleven factors were rated as important or essential by 96% or more of the respondents. Nine factors were rated as essential by at least 72% of the teachers.

Communicating safety needs was rated as essential by 57.3% of the teachers and as important by 39%. The understanding of legal responsibilities was rated as essential by 62.5% and as important by 33.8% of the teachers. Administering CPR in emergency situations was rated essential by fewer than 50% of the teachers and as important by about 36%. It was the only ability receiving some ratings of not important.

The factors rated as most important or essential tended to be those relating to student attitude: teaching safety in electricity, welding, and machinery areas; and developing general safety policies. Those dealing with first-aid, CPR, and managing problem students received slightly lower but still high ratings.

Importance Comparisons by Tenure Groups

The instructors in North Dakota teaching Vocational Agriculture were divided into two groups based on the number of years they had taught. The responses of those who had taught one to five years (beginning) were compared to responses from those who had taught six years or more (experienced).

These two groups exhibited a very high level of agreement concerning the importance of the 12 factors. Eighty-two percent of the experienced teachers said that developing a general safety policy was essential compared to 78.4% of the beginning teachers. The experienced teachers were in 80% agreement that it was essential to develop a general safety program versus 70.3% of the beginning teachers. Promoting a "safety" attitude among students was very highly rated by both groups, with 93.3% of the experienced teachers responding it was essential and 91.9% of the beginning teachers noting it was essential. Seventy-six percent of the experienced teachers felt that managing problem students in relation to safety was essential, whereas only 64.9% of beginning teachers felt it was essential. Almost 64% of the experienced teachers rated understanding the instructor's legal responsibility and liability in case of negligence as essential, but 56.8% of the one to five year teachers rated it as essential.

Almost 60% of the less experienced teachers rated communicating safety needs and concerns to the school administration as essential while 55.6% of the experienced teachers gave it the same rating. Approximately 78% of the beginning teachers rated providing first-aid in emergency situations as essential, while 65.9% of the experienced teachers rated it as essential. Administering CPR in emergency situations was rated as essential by 56.8% of the beginning teachers, but it was rated as essential by only 44.4% of the experienced teachers.

Four other factors were ranked highly and very similarly by the two tenure groups. The factors receiving similar ratings were: teaching safety in power and machinery, teaching safety in electricity, teaching safety in welding and other hot metal work, and teaching safety in carpentry and construction.

The instructor responses indicated high importance ratings of most selected skills. Some of the skills were rated low enough to indicate cause for concern. They were: administering CPR in emergency situations, understanding of the instructor's legal responsibility and liability in case of negligence, and communicating safety needs and concerns to the school administration.

TABLE 1 - PERCEIVED IMPORTANCE OF INSTRUCTOR SAFETY KNOWLEDGE OR ABILITY

	Percentages of the Total Group (N=82)				Percentages of 1 - 5 Years (N=37)				Percentages of 6/more Years (N=45)			
Safety Factors	E	I	SI	NI	E	I	SI	NI	E	I	SI	NI
1. Developing a general safety policy	80.5	18.3	1.2	0.0	78.4	18.9	2.7	0.0	82.2	17.8	0.0	0.0
2. Developing a general safety program	75.7	22.0	2.3	0.0	70.3	27.0	2.7	0.0	80.0	17.8	2.2	0.0
3. Promoting a "safety" attitude among students	93.0	7.0	0.0	0.0	91.8	8.2	0.0	0.0	93.3	6.7	0.0	0.0
4. Communicating safety needs and concerns to school administrators	57.3	39.0	3.7	0.0	59.6	35.0	5.4	0.0	55.6	42.2	2.2	0.0
5. Managing problem students in relation to safety	72.0	23.0	5.0	0.0	64.9	24.3	10.8	0.0	75.6	24.4	0.0	0.0
6. Providing first-aid in emergency situations	72.8	24.7	2.5	0.0	77.8	19.4	2.8	0.0	65.9	31.8	2.3	0.0
7. Administering CPR in emergency situations	49.4	35.8	12.3	2.5	56.8	24.3	13.5	5.4	44.4	42.3	13.3	0.0
8. Understanding the instructor's legal responsibility and liability in case of negligence	62.5	33.8	3.7	0.0	56.8	40.5	2.7	0.0	63.7	31.8	4.5	0.0
9. Teaching safety in power and machinery	83.0	15.8	1.2	0.0	81.1	18.9	0.0	0.0	82.2	15.6	2.2	0.0
10. Teaching safety in electricity	85.4	14.6	0.0	0.0	83.8	16.2	0.0	0.0	86.7	13.3	0.0	0.0
11. Teaching safety in welding and other hot metal work	85.4	14.6	0.0	0.0	86.5	13.5	0.0	0.0	84.4	15.6	0.0	0.0
12. Teaching safety in carpentry and construction	83.0	15.8	1.2	0.0	81.1	16.2	2.7	0.0	82.2	17.8	0.0	0.0

*NOTE: E = Essential I = Important SI = Somewhat Important NI = Not Important

There were few differences in importance ratings between beginning and experienced teachers. When very modest differences did occur, the experienced teachers tended to rate the skills as more essential.

Need for Improvement in Safety Skills

The Vocational Agriculture instructors were asked to indicate how much improvement they needed for each of the 12 skills previously rated for importance. The teachers were asked to rate each of the selected factors as extensive, moderate, limited, or no need. Percentages for each response were calculated for the entire group and for the two subgroups based on the number of years of teaching.

The two safety areas in which instructors indicated needing the most improvement were administering CPR in emergency situations and understanding of the instructor's legal responsibility and liability in case of negligence. The four factors in which 41% to 45% of the instructors indicated they needed extensive or moderate improvement were: communicating safety needs and concerns to the school administration, providing first-aid in emergency situations, managing problem students in relation to safety, and developing a general safety program.

From 21% to 40% of the instructors needed improvement in the remaining six areas which were: developing a general safety policy-39.5%, teaching safety in power and machinery-38.5%, teaching safety in electricity-37.2%, promoting a "safety" attitude among students-30.7%, teaching safety in carpentry and construction-23.7% and teaching safety in welding and other hot metal work-21%.

There were considerable differences in perceived improvement needed by the one to five year teachers compared to those teaching six or more years. The five areas in which beginning teachers needed more improvement were: developing a general safety program, promoting a "safety" attitude among students, understanding the instructor's legal responsibility and liability in case of negligence, teaching safety in power and machinery, and teaching electricity.

Only one area was indicated by the experienced teachers as needing more improvement than beginning teachers and that was providing first-aid in emergency situations. Fifty percent of experienced teachers reported extensive or moderate need for improvement compared to 36.4% of beginning teachers.

The teachers indicated that the greatest amount of improvement needed was in: administering CPR in emergency situations, understanding of the instructor's legal reponsibility and liability in case of negligence, and communicating safety needs and concerns to the school's administration. These areas were rated less important by the teachers when asked to rank knowledge and ability importance. From 21% to 59% of the entire group indicated they needed from moderate to extensive improvement in all of the 12 selected skill areas.

TABLE 2 - PERCEIVED NEED FOR IMPROVEMENT IN INSTRUCTOR SAFETY KNOWLEDGE OR ABILITY

	Percentages of the Total Group (N=82)				Percentages of 1 - 5 Years (N=37)				Percentages of 6/more Years (N=45)			
Safety Factors	E	M	L	NN	E	M	L	NN	E	M	L	NN
1. Developing a general safety policy	1.3	38.2	46.1	14.4	0.0	42.9	45.7	11.4	2.4	35.7	42.9	19.0
2. Developing a general safety program	5.3	35.5	42.1	17.1	5.7	40.0	40.0	14.3	4.8	31.0	42.9	21.3
3. Promoting a "safety" attitude among students	8.2	23.3	50.7	17.8	11.4	31.4	48.6	8.6	4.8	19.0	47.6	28.6
4. Communicating safety needs and concerns to school administrators	2.8	41.7	33.3	22.2	6.1	39.4	36.4	18.1	0.0	45.2	31.0	23.8
5. Managing problem students in relation to safety	5.1	37.2	47.4	10.3	2.9	40.0	51.4	5.7	4.8	40.5	40.5	14.2
6. Providing first-aid in emergency situations	10.0	34.3	40.0	15.7	3.0	33.4	51.5	12.1	14.3	35.7	28.6	21.4
7. Administering CPR in emergency situations	32.9	26.3	30.3	10.5	32.4	32.4	26.5	8.7	35.7	23.8	28.6	11.9
8. Understanding the instructor's legal responsibility and liability in case of negligence	14.7	41.3	33.3	10.7	22.9	42.9	25.7	8.5	7.1	42.9	35.7	14.3
9. Teaching safety in power and machinery	6.4	32.0	44.9	16.7	5.7	37.1	48.6	8.6	4.9	24.4	46.3	24.4
10. Teaching safety in electricity	3.9	33.3	47.4	15.4	8.6	34.3	48.6	8.5	0.0	29.3	48.7	22.0
11. Teaching safety in welding and other hot metal work	4.0	17.0	54.0	25.0	8.6	14.3	62.9	14.2	0.0	18.6	46.5	34.9
12. Teaching safety in carpentry and construction	2.6	21.1	48.7	27.6	5.7	20.0	60.0	14.3	0.0	21.4	38.1	40.5

*NOTE: E = Extensive M = Moderate L = Limited NN = No Need

When differences occurred, the beginning teachers usually indicated the higher percentage of improvement needed. These percentages of improvement needed support the need for in-service and summer classes in safety education.

Safety Policies and Practices

The instructors were asked to indicate whether 10 selected practices or policies were always, usually, seldom, or never carried out in their agricultural mechanics program. The data were tabulated by figuring percentages of the entire group's responses.

The responses indicate there is cause for concern in some safety practices and policies in agricultural mechanics programs. Before using power equipment, 70.4% of the teachers indicated they always administered safety tests to each student. Perfect scores were required on these tests by 29.6%, but 12.4% of the instructors never required a perfect score on safety tests. The safety tests were always kept on file for each student by 58% of instructors, but 5% of the instructors never kept safety tests on file.

Safety was always taught as a part of the respective agricultural mechanics unit by 87.7% of the instructors. The safety policy statement was always made available by 54.3% of instructors, while 9.9% never made the policy statement available.

Eye protection signs were always displayed by 48.1% of instructors but 8.6% never displayed the signs. While students are present, 22.2% of instructors indicated they usually remain in the laboratory, but 77.8% indicated they always remain in the laboratory. School budgets were reported to be usually adequate to provide a safe working environment in 95.1% of the laboratories.

The instructor responses show a number of weaknesses or causes for concern regarding the laboratory safety practices and policies. The entire issue of safety tests is a matter of concern indicating 12.4% of instructors never require perfect scores, and 5% of instructors never keep safety tests on file. Twenty-one percent of instructors seldom or never made safety policy statements available to students. Eye protection signs were seldom or never displayed by 24.6% of instructors. Only 77.8% of the instructors were always in the laboratory when students were present, while 22.2% of the instructors indicated they were usually in the laboratory when students were present. This tends to reinforce the need for additional education in safety practices and policies.

Safety Regarding Facilities and Equipment

The Vocational Agriculture instructors were asked to respond to 21 statements regarding the facilities and equipment in their laboratories. Responses were always, usually, seldom, or never provided or maintained. The data were tabulated by figuring mean scores and percentages on the entire group's responses.

TABLE 3 - EXTENT TO WHICH INSTRUCTORS FOLLOW SAFETY PRACTICES AND POLICIES

Safety Factors	Percentages (N = 82) Always	Usually	Seldom	Never
1. Safety tests are administered to each student before using power equipment	70.4	24.6	5.0	0.0
2. Perfect scores are required on safety tests before students may use a particular item of power equipment	29.6	40.7	17.3	12.4
3. The safety tests are kept on file for each student	58.0	22.2	14.8	5.0
4. Students demonstrate safe use of equipment to instructor before they are permitted to use it alone	47.5	47.5	3.8	1.2
5. Teaching safety is part of each unit-i.e. carpentry/welding	87.7	12.3	0.0	0.0
6. A general safety unit is taught at the beginning of each Agricultural Mechanics course	54.4	36.7	6.4	2.5
7. Safety policy statement is made available to all students	54.3	24.7	11.1	9.9
8. Eye protection signs are displayed	48.1	27.3	16.0	8.6
9. Instructor remains in laboratory when students are present	77.8	22.2	0.0	0.0
10. School budget is adequate to provide a safe working environment	39.5	55.6	4.9	0.0

TABLE 4 - SAFETY CHARACTERISTICS OF FACILITIES AND EQUIPMENT

Safety Factors	Percentages (N = 82) Always	Usually	Seldom	Never
1. Fuel is stored in properly labeled cans indicating content	61.3	33.8	5.0	0.0
2. Appropriate storage is available for flammable materials	32.5	55.0	5.0	7.5
3. A fire blanket is available in the laboratory	27.2	62.0	6.2	60.5
4. Electrical extension cords have grounding conductors	71.3	28.8	0.0	0.0
5. Electrical cords are in good repair	59.3	40.7	0.0	0.0
6. Fire extinguishers are available	98.8	1.2	0.0	0.0
7. Fire extinguishers are checked regularly	92.5	7.5	0.0	0.0
8. The laboratory area has adequate ventilation	38.3	50.6	8.6	2.5
9. Dust collection devices are installed in the shop	16.3	6.3	11.3	66.3
10. A first-aid kit is available and accessible in the shop	80.2	17.3	2.5	0.0
11. There is an eyewash or irrigation bottle near where batteries are charged	17.5	6.3	8.8	67.5
12. Exits are free from obstructions	50.6	49.4	0.0	0.0
13. Exits are clearly marked	70.0	22.5	3.8	3.8
14. Grinder shields are kept in place	47.5	51.3	0.0	1.3
15. Belts, pulleys, and moving parts are properly guarded	63.0	35.8	1.2	0.0
16. Power grinder tool rests are properly adjusted	31.3	68.8	0.0	0.0
17. Power grinder stones are kept properly dressed	26.3	71.3	2.5	0.0
18. Industrial grade eye wear is available to all students	78.8	16.3	5.0	0.0
19. Industrial grade eye wear is clean and in good repair	40.0	53.8	3.8	2.5
20. Industrial grade hearing protection is available to all	3.8	11.3	8.8	76.3
21. Adequate storage is provided for lumber and steel	18.8	58.8	15.0	7.5

The instructors indicated there were many areas of concern regarding facilities and equipment and how they are provided or maintained. Only 61.3% of the instructors indicated that fuel is always stored in properly labeled cans indicating content, while 7.5% indicated appropriate storage is never available for flammable material. Electrical extension cords were noted by 71.3% of the instructors to always have grounding conductors, while 28.8% indicated they usually have grounding conductors on electrical extension cords.

Teachers indicated that fire extinguishers are always available by 98.8% of the entire group. Instructors indicated that 66.3% of laboratories do not have dust collection devices installed. Instructors responded that 67.5% of laboratories do not have irrigation or eyewash bottles near where batteries are charged. Industrial grade hearing protection is never available to all students of 76.3% of the instructors.

First-aid kits were always available and accessible in the shop as indicated by 80.2% of the teachers. Industrial grade eye wear is always available to all students according to 78.8% of the instructors.

Responses to facility and equipment statements indicate cause for concern. Again, this would reinforce the need for training sessions relating to shop equipment maintenance and design or layout of laboratory facilities. Areas which have room for improvement include: fire blankets available in the laboratory, dust collection devices, eye wash bottles in locations where batteries are charged, safe electrical cords, power grinder shields, and industrial grade hearing protection.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1. Instructors generally rated the safety knowledge and skills as essential or important.

2. Teacher ratings of the importance of the safety knowledge and skills generally differed little according to years of teaching experience.

3. There is a perceived need for improvement by instructors in certain areas; especially first-aid, CPR, and legal responsibilities.

4. Beginning teachers indicated a greater need for improvement in safety knowledge and skills than did the experienced teachers.

5. There is a need for more strict adherence to safety policies and practices.

6. There is a need for improvement in the safety aspects of facilities and equipment including electrical cords, ventilation, and hearing protection.

Recommendations

1. Consideration should be given to providing in-service opportunities in certain topics including safety policies, legal responsibilities, first-aid (including CPR), and the safety aspects of equipment and facilities.

2. Schools and Vocational Agriculture departments ought to examine current safety policy, carefully develop safety policy, make it known to all students, and follow that policy.

3. Schools should give closer scrutiny to the safety of their facilities and how they are managed.

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WORKSHOP EFFECT ON CURRICULUM IMPLEMENTATION

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INTRODUCTION

The structure of Missouri production agriculture, like that of other states across the union, is in transition. It has become increasingly apparent that many farms are having limited success at profitably producing traditional crop and livestock commodities (Campbell, 1984). As such, many of Missouri's farmers are interested in the production of alternate or specialty crops such as fruits and vegetables.

The Governor of the State of Missouri formed the Governor's Task Force on Rural Development (1983:2) with the charge to evaluate the state's natural resources and to develop plans to insure the viability of Missouri's rural sector. In their report, the Task Force (1983:8) stated that Missouri had potential for increased fruit and vegetable production and that an increasing percentage of cash farm receipts could be generated from the production of fruits and vegetables and other specialty crops. Based upon their findings, the Task Force (1983:9) recommended that, among other things, programs should be developed to encourage the production of fruits and vegetables. They also recognized the role of vocational education in "revitalizing Missouri agriculture" when they stated, "Increased emphasis should be placed on training using the expertise of vocational education . . ."

In light of the aforementioned mandate and based upon the recommendations of the Missouri Vocational Agriculture Teachers Association Teaching Aids Committee, the Missouri State Department of Elementary and Secondary Education commissioned and provided funds for the development of a "Fruit and Vegetable Crop Teacher Curriculum Guide". This teacher's guide was developed as a 20 day optional unit for inclusion into the sophomore level "Agricultural Science II Core Curriculum". The curriculum guide included sufficient lessons so that an instructor could also use it for an advanced production course.

The curriculum materials cycle can not be considered complete until the materials and the technical means to teach those materials have been effectively disseminated to those teachers for which it was intended. Failure to provide plans for dissemination and adoption would be a monumental loss to those teachers (and students) who would have benefited

from the implementation of developed materials not to mention a considerable waste of human and monetary resources. If educators want newly developed curriculum materials to be utilized, teachers must be made aware of their value and familiarized with their content (Boardman, 1980; Finch and Crunkilton, 1979; Marks, 1978). It should behoove the commissioners and developers of new high school agriculture curriculums to provide a speedy, efficient, and effective method for the dissemination and adoption of those materials in vocational agriculture programs. Instructors must be introduced to and familiarized with the new curriculum materials as well as provided with the technical background necessary for successful implementation.

Dissemination and subsequent implementation of new and innovative materials has been emphasized at all levels of vocational education (Marks, 1978; Shinn and Bail, 1983). Inservice workshops have often been utilized to encourage or facilitate the implementation of innovative curriculum materials. Their effectiveness has been assumed, yet there is little information as to the development or structure of effective inservice workshops for introducing and encouraging the implementation of new curricula. It is important that new and innovative curricula, such as the Fruit and Vegetable Production teachers guide (and others like it), be accepted by vocational agriculture teachers and incorporated into their course offerings. As such, the effectiveness of inservice workshop techniques designed to effect teacher change and, as such, encourage the implementation of new curriculum is in need of substantiation (Cruikshank et. al., 1979).

PURPOSE AND OBJECTIVES

It was the purpose of this study to collect data describing the effect of two different workshop approaches on technical knowledge mastery and on the subsequent implementation of a new fruit and vegetable crop production curriculum by Missouri vocational agriculture teachers. The primary research question was: Will two different workshop approaches have a differing attained effect on instructor technical expertise level and on the rate or degree of implementation of this new curriculum? A second research question was: Is there a relationship between expertise and the rate or degree of curriculum implementation?

PROCEDURES

Workshops were conducted to introduce and familiarize Missouri vocational agriculture instructors with a new unit in "Fruit and Vegetable Production" (Mullinix and Stewart, 1984). The training sessions were conducted during the summer of 1984. Only one session was needed to obtain an adequate sample size for treatment one (workshop with the new teaching materials distributed to participating instructors). It was conducted on the University of Missouri-Columbia campus during the month of July, 1984; 28 subjects were in attendance. Two separate workshops were required to obtain adequate sample size for treatment two (an identical workshop without the curriculum being given or even shown to the participants). One session was conducted on the University of Missouri-Columbia campus on the same day of the previously described session; ten subjects were in attendance. The balance of subjects, ten, in treatment group two (for a

total of 20 subjects) participated in a training session held in August, 1984 on the campus of Missouri Southern State College. Attendance of all subjects in all sessions was entirely voluntary. All training sessions were identical in duration, format, and content with the exception of distribution of the prepared curriculum materials in treatment one and the exclusion of those materials in treatment two. Because instructors were free to participate in these workshops or not, control of the quantity of participants in any one session was impossible. The same person conducted all workshop sessions. At the end of all workshops, the subjects were given a written, post treatment examination (achievement test concerning the materials presented) designed to take no more than 30 minutes to complete. The subjects were allowed to take all the time necessary to independently complete the exam. No individual took over 30 minutes. Control group subjects took the exam prior to their training workshop. That session was conducted on the Savannah High School campus in Savannah, Missouri during the month of August, 1983 in conjunction with an area vocational agriculture teachers meeting. Sixteen instructors voluntarily participated in that afternoon session. Additionally, demographic data were collected from all experimental and control group subjects at the same time the achievement test was administered. No subject was aware of his or her participation in a formal study.

The instrument (achievement test) used to measure the technical expertise of the participating instructors was developed by the researcher; the same person who developed the new curriculum materials and conducted the training sessions. It consisted of 35 multiple choice type questions and five fill-in-the-blank questions for a total of 40 objectively scored items. The questions directly reflected the technical information in the new fruit and vegetable curriculum materials and, hence, the workshop content itself. The number of questions for each sub-area of the curriculum subject matter content was reflective of that sub-area's relative importance and emphasis in the curriculum guide. Content validity of the instrument was established by examination of the instrument by an Associate Professor of Horticulture of the Department of Horticulture at the University of Missouri-Columbia. That professor examined each test item in conjunction with the completed curriculum materials and an outline of the workshop session and assessed the test to be representative of those materials. To assess test reliability, item responses were subjected to the Kuder-Richardson test for internal consistency known at K-R formula 21 (Borg and Gall, 1983; Erickson and Wentling, 1976). Reliability of the instrument was calculated to be 0.84.

In the fall of 1984 after teaching calendars were to have been finalized, the participating teachers were mailed a questionnaire to survey their intent to implement the fruit and vegetable production unit. If they responded positively (intended to use the new unit in their program), they were asked to indicate which lessons they anticipated using, when they would teach them, in what course they would be taught, and how many days they would devote to teaching the topic. If they responded negatively (did not intend to use the new unit), they were asked to provide a reason. Questionnaires were mailed to all 64 subjects. Subjects that failed to return the mailed questionnaire (11) were subsequently surveyed via telephone. Responses were received from all 64 subjects.

The subjects for the experimental treatment and control groups in this study were all practicing Missouri vocational agriculture instructors from all parts of the state. The subjects were not randomly drawn from the state's general agriculture teacher population; rather, they chose or asked to participate in a workshop introducing the new fruit and vegetable curriculum materials. Again, there were 28 subjects in the treatment group in which the new teaching materials were distributed and 20 subjects in the treatment group in which the new curriculum materials were not distributed. The control group consisted of 16 subjects.

Because complete randomization of subject assignment proved impossible, a quasi-experimental, group comparison type design was utilized. Borg and Gall (1983) describe this experimental design as one in which treatment groups are administered a post test but not a pretest and the subjects are not randomly assigned to the treatment groups. The steps involved in this research design are:

1. Assign treatments to experimental and control groups.

2. Administer treatments to the experimental groups but not to the control group.

3. Administer post test to the experimental treatment groups and to the control group.

Borg and Gall (1983) recommend the exclusion of a pretest when it could have an effect on the experimental treatment and, hence, the outcomes measured by the post test. This was deemed the case in this study in that the workshops were only two hours in length.

In this study, there were three independent variables and two dependent variables. The three independent variables were:

1. Workshop with the new curriculum guides in hand. The participants were given the new teaching materials at the beginning of the training session to refer to during the session and to keep. Workshop topics and presentations were related to specific unit objectives and individual lesson subjects as per the curriculum guide.

2. Workshop without the distribution or use of the new curriculum guide. The presentation of technical material and topics was identical to the aforementioned workshop. The participants were not given or shown a copy of the new curriculum materials and were, therefore, unable to refer directly to it during the training session.

3. The control for the achievement portion of the study was a group comprised of vocational agriculture instructors who were given the achievement test prior to their training session. There was no control group for the implementation portions of the study. It was originally intended that instructors who independently procurred the curriculum guide would serve as the control group for the implementation portions of the study. However, not enough teachers independently obtained the guide (other than those already involved in the study) to make a meaningful comparison possible.

The dependent variables in the study were:

1. The level of technical expertise of each participating subject assessed on the basis of scores obtained from the achievement test.

2. The rate or degree of curriculum materials implementation by those instructors participating in the study (assessed by written or telephone survey).

The following hypothesis, stated in the null form and tested at the .05 level of statistical probability, were designed to reflect the objectives of the study.

Ho_1: There is no significant difference among workshop group mean achievement test scores (technical expertise) for vocational agriculture instructors participating in three different workshop treatments.

Ho_2: There is no significant difference in the rate of curriculum implementation between treatment groups.

Ho_3: There is no difference in mean achievement test scores between those instructors implementing the curriculum and those not implementing the curriculum.

RESULTS

To assess technical expertise, each subject in all treatment groups completed an achievement test. To test null hypothesis one, analysis of covariance was utilized to detect any difference among mean achievement test scores for the workshop treatment groups and control group. The hypothesis was tested at the .05 level of statistical probability and was rejected. Table 1 presents an F-value of 60.23 that indicates a significant difference among the group test scores. The covariants used in this test were previous horticulture teaching experience, previous horticulture work experience, and college level horticulture credits earned. Treatment group achievement test mean score separation was achieved using the Least Significant Difference technique. Table 2 shows that both treatment groups, with and without guide, did not have a mean achievement test score that was significantly different from one another. However, the control group did have a mean achievement test score that was significantly (one percent level) lower than either of the experimental treatment groups. The mean achievement test score for the with guide treatment was 31, the mean score for the without guide group was 30, and the control group mean score was 18.

In the follow-up survey, vocational agriculture instructors who had participated in the workshops were asked, among other questions, if they intended to use (implement) the new curriculum either in part or in whole. Their responses were required to be yes or no. Table 3 shows the chi-square analysis of their responses testing null hypothesis two (Ho_2). The hypothesis was tested at the 5 percent level of statistical probability. With a chi-square of 2.290 and a probability of 0.3183, Ho_2 was not rejected. Observed rates of curriculum implementation did not

Table 1 - Analysis of Covariance[1] - Effect of Workshop Approach on Technical Expertise (Achievement Test Score)

Source	df	MS	F-value
Treatment groups	2	987	60.23*
Error	61	16	

C.V. = 14.7329
*Significant at 1 percent level of statistical probability.
[1]Covariants = horticulture teaching experience, horticulture work experience, and college level horticulture credits.

Table 2 - Least Significant Means Test Showing Effect of Treatment on Technical Expertise (Mean Achievement Test Score)

Treatment	Mean test score[1]
With guide	31[a]
Without guide	30[a]
Control	18[b]

[1]Mean separation by Least Significant Difference technique; significant at 1 percent level.
Means with like superscripts are not significantly different.

significantly differ from the expected frequency of implementation nor did those observed frequencies for each treatment group differ significantly from each other. It must be noted again that the control treatment served only as a control for the achievement portion of the study. The control group differed from the without guide treatment group only in that they were administered the achievement test prior to the workshop session. As such, the control group could not be utilized for a meaningful comparison in a truly experimental climate.

Table 3 - Chi-Square Analysis of Curriculum Implementation Rate by Treatment Group

Treatment group	Implementation rate: No response	Will not implement	Will implement	Total number of respondents
Control	0.0 / 0.0	3.0[a] / 3.1[b]	13.0 / 12.9	16
Without guide	0.0 / 0.0	6.0 / 3.9	14.0 / 16.1	20
With guide	3.0 / 0.0	3.0 / 4.9	22.0 / 20.1	25

[a]The observed frequency.
[b]The expected frequency.
Chi-Square = 2.290
df = 2
Probability = 0.3183

A factorily arranged analysis of variance was utilized to determine if technical expertise level (as reflected by achievement test score) affected the implementation rate. Ho_3 was rejected. Implementation was determined to be significantly affected (5 percent level of statistical probability) by technical expertise (achievement test score) as indicated by an F-value of 4.52. Again, as per Ho_1, treatment groups did differ significantly as to mean test score. Likewise, there was no significant interaction between treatment group and implementation rate as per the report on Ho_2. Table 5 presents a mean achievement test score separation between those implementing the curriculum and those not implementing the curriculum. Those instructors who indicated they intended to implement the curriculum had a significantly higher mean achievement test score (26.74) than the mean achievement test score (23.89) of those indicating they did not intend to implement the curriculum.

Table 4 - Factorially Arranged Analysis of Variance of Effect of Achievement Test Score and Rate of Curriculum Implementation

Source	df	Mean square	F-value
Implementation	1	71.26	4.52*
Treatment	2	537.34	34.08**
Implementation rate x treatment group	2	5.82	0.37
Error	55	15.76	

C.V. = 14.61
*Significant at five percent level of statistical probability.
**Significant at one percent level of statistical probability.

Table 5 - Least Significant Means Table for Mean Achievement Test Score by Implementation and Treatment Group

Implementation rate	Treatment group			$\bar{X}$ Score[1]
	Control	Without guide	With guide	
No	16.00	28.67	27.00	23.89[a]
Yes	18.38	30.43	31.41	26.74[b]
$\bar{X}$ Score[1]	17.19[x]	29.55[y]	29.20[y]	

[1]Mean separation by Least Significant Difference Technique; significant at 1 percent level.
Means with like superscripts are not significantly different.

DISCUSSION

It was the purpose of this study to ascertain the effect of two workshop approaches on mastery of technical subject matter and the subsequent affect on implementation of a new fruit and vegetable production curriculum by Missouri vocational agriculture instructors. Significant gains in technical subject matter understanding by vocational agriculture instructors was realized as a direct result of the two hour workshop. It is reasonable to assume this to be an effective (efficiency was not established in this study) method for improving or expanding the technical expertise of vocational agriculture instructors, particularly in regard to content of new curriculum materials. It was also found, however, that providing instructors with the curriculum materials did not increase rates of intended implementation. This was probably due to the fact that those instructors participating in the workshops were already very interested in incorporating fruit and vegetable production into their programs and would have done so in any event. It should be noted that Missouri agriculture instructors are in an enviable position in that they are accustomed to being able to readily obtain tailored curriculum materials at exceedingly reasonably cost from a central state supported agency. Were that not the case, the gratis, dissemination of new curriculum materials might indeed have a profound effect on rates of curriculum implementation. When examining the results of this study and discussing the merits of supplying instructors with curriculum materials during introductory inservice workshops, it is interesting to note that 82 percent of the treatment group given the curriculum guide intended immediate implementation while only 29 percent of the "without" group had the same intention. In fact, 71 percent of the "without" group indicated they would wait a year or longer to implement it. This may be an indication that if expeditious implementation of new curriculum materials is desired, then supplying those materials to instructors may be of great value.

It appeared that subject matter technical competence played a significant role in determining an individual instructor's decision to implement the new curriculum. If that is true and workshops such as the ones conducted for this study are an effective means of elevating teacher technical expertise (this study indicates that to be so), then it can be expected that similar workshops will have the indirect effect of encouraging new curriculum implementation. It must be emphasized that this expectation would be dependent upon the effectiveness of the workshop in regard to increasing technical expertise.

In support of Curry and Check (1982) and Puese and Swanson (1980), this study also revealed that most instructors who indicated that they would not implement the curriculum said that it simply did not fit well into their existing programs.

CONCLUSIONS AND RECOMMENDATIONS

As a result of the findings of the experimental components of this study, the following specific conclusions were drawn:

1. Workshops designed to introduce new curriculum materials to instructors and familiarize those instructors with the technical subject

matter of the materials is an effective means of improving curriculum implementation.

2. Use of actual curriculum guides for reference during such workshops (see #1 above) is not necessary to effectively raise technical subject matter expertise levels of potential instructors.

3. Supplying instructors with curriculum guides did not appreciably affect the participating instructors' ultimate decision to implement the curriculum; however, it did affect when the curriculum would be implemented.

4. There was a positive relationship between technical expertise level and an instructor's decision to implement the curriculum, i.e. curriculum implementors demonstrated higher technical expertise than did non-implementors.

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DISCUSSION OF RESEARCH REPORTS ON EVALUATING AND ASSESSING AGRICULTURAL EDUCATION EFFORTS

CENTRAL STATES RESEARCH SEMINAR
FEBRUARY 23, 1987

Robert A. Martin
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Many times we find that research raises more questions than it answers. Accordingly, I plan to raises several questions in reviewing these studies. I intend to identify some strengths regarding each research study and give some general comments.

REPORT I: A FOLLOW-UP EVALUATION OF A FRUIT AND VEGETABLE INSERVICE PROGRAM FOR VOCATIONAL AGRICULTURE TEACHERS BY Julia Gamon and L. DeVere Burton

Strengths of the Paper

I compliment the authors for conducting research on an interesting and timely topic. The topic may appear to be merely focused on a fruit and vegetable inservice program, however the accompanying issue is that of follow-up evaluation of inservice programs. The overall topic of inservice education is a critical one for agricultural education.

I compliment the authors for a review of the literature to support the theoretical base of the study, although most of the studies cited referred to inservice education and its focus on pedagogy. It is interesting to note and I am concerned that no agricultural education studies were cited. There are agricultural education research studies on this topic but perhaps not enough. As the authors stated "evaluation of inservice programs may be an unfulfilled scholarly research area."

At first reading, the purpose and objectives of the study appeared to be clearly stated, however I became less convinced of the author's intent the more I read the paper.

The statistical treatment appeared to be appropriate given the data the authors collected.

The study merits discussion and the issues raised merit considerable debate.

Questions and Comments

The study has a lot of merit, but I do have several questions and concerns regarding the procedures, findings, and conclusions.

The authors should give a more specific explanation of the population and sampling procedures. Discussion of these two critical elements was brief and somewhat confusing. The discussion of the population was separated from a discussion of the sample by a section on the "treatment". What justification do you have for the samples that were taken? Also, I have some problems with the use of the word "treatment". Use of this term implies some kind of experiment. Was the study an experiment?

Each instructor participating in the workshop received a comprehensive notebook. Did the non-attendees also receive the notebook? Is the notebook available to the non-attendees?

The first objective of the study was focused on "implementation of instruction" but under the findings/results section the authors state the objective of the study was to determine if there were differences in "curriculum implementation". At this point, I became confused just what was being investigated. One statement seems to focus on instruction and the other on content. The author's intentions should be clarified.

How was the instrument developed? We need more detail regarding the instrument used to collect the data. What was the reliability of the instrument?

According to the author's discussion, the response rate for the data collection instrument appeared to be adequate after the authors made two follow-up contacts by mail. Although it may be adequate, it would be interesting to note why some of those persons contacted chose not to respond. What unique qualities, if any, do non-respondents have? Why not call a few people in order to conduct comparisons between respondents and non-respondents.

Did you ask respondents the extent of their work experience in horticulture? This factor could have a significant bearing on response to and incorporation of horticulture course work into the curriculum.

I have a concern that some of the data in the narrative is different than that in the tables.

My greatest concern in the analysis of this study is focused on the conclusions and implications section. It is not clear to me that the authors have shown that "inservice makes a difference", although they state that it does. It is clear that in this study attendees and non-attendees of this inservice program appear to differ in three areas as tested by Chi-square analysis. I do not believe this data is enough information to make such a bold statement. The attendance at the workshop may not have been any stronger of an influence than the materials that were distributed.

One of the author's conclusions was that teachers who attend the horticulture inservice program promoted fruit/vegetable supervised occupational experience programs (SOE) with their students whereas non-participating teachers generally did not. This is a strong statement. How do you know the non-attendees didn't promote it? As evidenced by Table #1, they were asked if they had students with SOE programs in fruit/vegetable production. There appears to be a difference.

The authors indicated that non-attendees listed the lack of "materials" as a reason for not teaching a unit on fruits and vegetables. What materials - instructional materials (ie. unit plans, lesson plans) or tools (ie. equipment etc.)?

The data indicate that only 10 people out of 91 respondents had taught a fruits and vegetables unit for the first time. This information implies that the other 81 teachers had taught such a unit in previous years or not at all. What implications does this fact have for making a statement like "inservice makes a difference". It may have for the 10 teachers but who knows for the other 81?

Finally, the authors imply that the teachers received training. Did they? It appears they received information and materials. They were informed. It is somewhat misleading to equate information with training.

The key element of this study was that there was follow-up of an inservice education program. We must continue to determine the extent to which teachers are incorporating new knowledge and skills into the curriculum as a result of inservice education. I encourage the authors to maintain their efforts.

REPORT II: SAFETY ASSESSMENT OF
NORTH DAKOTA HIGH SCHOOL
VOCATIONAL AGRICULTURE MECHANICS PROGRAM
BY
David Nichols and Donald Priebe

Strengths of the Paper

This study, while it is not a study about inservice education, it does have implications for inservice education programs. It would seem that we can never know enough about safety and how to maintain a safe environment. This study is worthwhile in that it reminds us that safety is not something we should take for granted or that we know all there is to know. It is one of those "constant reminder areas" of our profession.

Much of the study on safety in agricultural education has focused on equipment, material, testing etc. Perhaps more focus should be placed on modeling accepted practice and shaping, as the authors state, a "safety attitude" among students. One could question whether there is any value in learning about safety by threatening or testing or some negative approach. Before we can expect students to have positive safety attitude, it is essential to have teachers with positive safety attitudes.

Safety and the practice thereof is often considered sacred - somewhat akin to motherhood, apple pie and U.S.A. - who could be against it?

With that statement in mind, I am not sure what this study has told us other than we need to be reminded to be ever vigilant in promotion of safety. I am not sure we can teach safety in the same sense that we teach skills related to and knowledge about welding, small engine repair or tractor maintenance. I do believe we demonstrate proper use of equipment, tools, materials etc. and in so doing, promote safe practice. Also, I am not sure students get particularly motivated to study safety as a "subject matter area," however they can get excited about studying engine mechanics, robotics, tractor driving and the proper way to go about it. The same principle applies to the study of fertilizers without relating it to a crop. It is academic, dry, and unreal. Why wouldn't some students score poorly on a purely academic test on safety. I'm not sure what this says about practice. Surely we realize that a written test for some students is a very poor indicator of practice, especially if in practice they see a model - a teacher - perform the way they are to perform. It is a case of seeing a lesson - not hearing it.

I compliment the authors for a well written paper. The paper has a well stated rationale for the study and the information is presented in a logical and understandable way. I also compliment the authors for receiving a 100% response rate for the questionnaire. It is obvious the teachers in North Dakota are quite cooperative and recognize this issue as an important one. I am sure this response rate also has something to do with the ease of providing responses to the questionnaire. The statistical analysis appears to be appropriate for the data collected.

Questions and Comments

While I enjoyed reading this paper and believe the study to be worthwhile, I do have a number of concerns and general comments. More explanation regarding the development of the questionnaire would be helpful. It would also be helpful to describe the questionnaire more completely, especially the scale used and the various sections. What is the reliability of the instrument used in the study?

The tables are not referred to in the narrative of the paper. The data in the tables seem to be repeated in the narrative. If one has tables in a paper then reference should be made to them in general and highlight the specifics. I would suggest that the authors not repeat everything in the narrative that is in a table.

CPR was the only area receiving a "not important" rating by some respondents. This finding indicates to me that all of the other items were considered important by the respondents. The degree of importance is perhaps interesting but not necessarily essential. The major importance of this study could be the identification of areas needing extensive to moderate improvement, ie. communication, emergency first-aid, student management and a general safety program. This finding has implications for further research and inservice education programs.

If safety is an attitude, then how will more instruction about it really change anything? Does a perfect score on a test mean that there will be correct or excellent performance in the laboratory or field?

Does it make a difference that this study was conducted? For one thing, the study did identify some inservice program needs. Secondly, the study makes it clear that safe practices and a safe environment are essentials for a successful instructional program in agricultural education. We need to continue to emphasize that fact. I compliment the authors for again raising our awareness of this issue.

REPORT III: WORKSHOP EFFECT ON CURRICULUM IMPLEMENTATION.

BY

Mark K. Mullinix, Curtis R. Weston
and Richard E. Linhardt

It is interesting to note the similarities of the information and findings in the Gamon and Burton study and this study. Although the procedures are different the findings are related. Although the studies deal with the important topics of inservice education and introduction of new instructional materials, I challenge the researchers to go beyond these issues and investigate the effectiveness of delivery of the subject matter and its effect on student learning. That is the real test of the effectiveness of inservice education.

Strengths of the Paper

It is often implied that the delivery of teaching materials to teachers will in itself improve delivery of the subject matter to students. This idea may be debatable. However, the authors should be commended for stating that "the instructional materials cycle can not be considered complete until the materials and the technical means to use them have been effectively disseminated to those teachers for whom they were intended".

I compliment the authors for providing a comprehensive review of the literature and providing a rationale for the study. The purpose of the study was clearly stated. An experimental design is an appropriate design for agricultural education research. We should use experimental designs more often. The researchers wisely evaluated the validity and reliability of the instrument. The statistical treatment appears to be appropriate for the design of the study.

Questions and Comments

Although this was an interesting study and I compliment the authors for conducting it, I do have a number of questions especially regarding the procedures you followed.

The length of the workshops seems questionable. Two hours for each workshop seems short especially when 30 minutes were allowed for an exam. What was delivered at these workshops? Did you introduce the materials and present a model for presenting them? The workshop content needs to be clarified. To what extent can effectiveness be measured given the fact that the workshops were so short?

It appears the 4 workshops were conducted at 3 sites. What evidence can you provide that they were all conducted in the same manner, except for the materials? Also, since there

was a time lag between the group receiving the instructional materials and one of the groups' workshops, - what evidence can you provide that the teachers did not share information given the fact that vocational agriculture teachers have a considerable capacity for networking.

The authors indicated that no subject was aware of his/her participation in a formal study. What evidence do you have of this fact? Did participants earn credit for the workshops or are they accustomed to taking exams at workshops?

The authors indicate that the instrument (an achievement test) measured technical expertise. I believe it measured knowledge. It is debatable that knowledge is necessarily the same, in a total sense, as technical expertise especially in a field like agriculture which is based on practical application. Just because teachers know the content may not necessarily mean they can delivery on it.

The authors in this study as in the Gamon and Burton study, tend to equate technical information update with "training". I question this equation.

Please explain the control group procedures more clearly. I had a considerable amount of trouble following your explanation of the procedures in this area. You describe in detail what Borg and Gall require for experimental design and then you fail to explain carefully the control group and the procedures used for it. My concern here is that you stretched the explanation out over several different paragraphs. You continue to use control group data but you continually reported that it could not be used for meaningful comparisons.

Did any of the teachers who did not receive the instructional materials packet request some sort of materials? How did you present the material and not get requests for instructional materials?

It was interesting to note from your data analysis that the higher the test score the higher the tendency to use the instructional materials. This information would imply that the more one knows about the subject matter the more likely one will use the instructional materials. Since the groups didn't differ in mean test scores could it be that the instructional materials were not the contributing factor for differences as much as work experience, course work in horticulture etc.? Having the materials helps but having the knowledge influenced their use.

The authors appear to put a great amount of weight on the value of a two hour workshop to significantly increase the expertise of a group of teachers. Although you don't

describe the teachers (ie. experience, education) it is implied that a number of the participants were experienced and knowledgeable in horticulture before attending the workshop.

There is a real problem in using volunteers as participants in studies of this kind. The danger is not in using volunteers perhaps, but in the analysis of the data generated by them and the significance researchers attach to it.

Finally, I encourage the authors to review the manuscript carefully, but more importantly continue to develop studies using the experimental design.

Paper Critique: Central States Research Conference, 1987
Paper Title: Professional Competencies Needed By Beginning Cooperative Extension Agricultural Agents in Minnesota, North Dakota and South Dakota

Author(s) Dougou Keita and Vernon D. Luft.
Institution: North Dakota State University
Reviewer: Edgar Persons, University of Minnesota

This paper has at least four characteristics that contributed to its potential ~~unfullness~~ usefullness.

1. It is based on prior research and utilizes the results of prior research to further elaborate on the educational needs of an important group in agriculture. 2. It includes respondents from three coterminous states where there is a significant amount of interchange of extension field staff. 3. It is a complete census leaving little room for sample errors and 4, it asks significant questions: what should county agriculture agents know and where should they learn the things they should know? I commend the authors for their vision in addressing these four points adequately.

I have no questions about methodology. The development of the questionnaire, the testing of the instrument for construct validity through a panel of experts and reliability through statistical computation all are within the boundaries we normally accept for adequate research technique. The curious will inquire of the authors what techniques they used, promises they made or threats they delivered to obtain a 100% response! Just one minor point: The data in Table 2 are not correct. The percentages are not always correct since there was some non-response not

accounted for.

There are some common traps the authors have stepped into, and I would like to comment for a moment on them.

The title says "professional competencies needed by..." and then asks those who have them to judge if they are needed. Would it not make sense to ask those who are the clients of county agents what they think county agents need to be effective? For example, county agents said that the least important competency was "knowledge of psychological theories of learning." It is highly likely that only a few of the agents had ever had any instruction in psychological theories of learning. Their clients probably have not either. But I bet a significant number of clients would think that knowing some of the psychological theories of learning would be quite important for someone engaged in teaching others.

It may have been useful to title this study "Professional competencies possessed by..." Then at some future date a study could validate if what agents possessed is what they needed. From a casual observation of the competency list one gets the impression that there may be significant gaps between what is possessed and what might be needed by clients.

It is interesting to analyze further the kinds of activities that were relegated to various forms of training or methods of gaining the skill or competency. It would be safe to say that if one

thinks a competency is not very important, it can be learned on the job. Of the 21 competencies where more than half suggested it should be learned on the job, 14 were in the bottom half in importance. I always find conclusions and recommendations interesting. It's the place we can let our bias creep in and hope nobody is looking.

Conclusion 1. Most of the competencies are important: - no argument.

Conclusion 2. Most of the professional competencies should be developed on the job and during undergraduate education.

Question: If these competencies are needed by <u>beginning</u> agents, how can they be learned on the job?

The recommendations are for the most part adequate but at times inconsistent with the data. One recommendation suggests research should be taught in the undergraduate program, yet the respondents ranked the two items 17 and 39 out of 40 - hardly a strong recommendation for inclusion.

But it was an interesting study. It should be of some value to extension administrators who plan staff development activity. It was carefully written and for the most part accurately described. On a scale of 1-10 it gets at least a 9.

Paper Critique: Central States Research Conference, 1987
Paper Title: Delivery of Adult Agricultural Education: A Case Study
Author(s): Larry Miller and Jamie Cano
Institution: The Ohio State University
Reviewer: Edgar Persons

The general objectives for this study are commendable - what is the status of adult education in agriculture? Why don't some schools offer adult education? What do adults need? And how many people are willing to participate: all good questions to ask.

Four groups were asked about their perceptions: farmers, agribusiness persons, teachers and county agents. The response rate for farmers and ag business were not high, but in the expected range.

The data was presented in short precise tables, easy to read, but for the most part with misleading titles. However, the tables rather clearly show the most likely places that the client groups will go to seek information. Perhaps a more significant observation is that farmers and agribusiness persons have no clear cut preferences. It is also interesting to note that owner/managers view their source of information differently for themselves than for their employers.

I have some questions about the scaling selected for this study. Why was a 1-6 ranking selected for the response scale for most of the questions? Exactly how was the scale used? Was it a Likket

type scale or a ranking scale? If it was a ranking scale, why wasn't the frequency for each rank reported rather than a mean of the rank. But I was most puzzled by the scale on tables 10 and 11 where the response "Does not apply" was given a higher point value (12) than strongly agree (10). There is no indication that the "does not apply" category was left out of the reported mean scores. If it was left in as I am led to believe, if half the people said an item does not apply and the other half scored it as strongly disagree, it would get an average score of 6.5 which would place it in the slightly agree category.

I must admit I never did make any sense out of the table that reported farmer agreement to statements about adult education in agriculture (or the one which followed about agribusiness persons). It did not fit into the objectives, was not supported in the brief literature review and was remote from the title suggesting a study of delivery.

For Ohio, this study should be rather carefully reviewed. I think it does, as the conclusions suggest, show that the potential clients on farms and in businesses have been participants and will continue to be participants in adult education.

Who provides the education is an unsettled question. This paper does not provide, contrary to the conclusions, a clear mandate as to who the preferable purveyor is for education for farmers or

education for agribusiness.

Because of what I think to be inappropriate conclusions, I believe some of the recommendations are subject to careful review. They must be supported both by data and good judgement.

Two technical points that should be reviewed by the authors: 1) the references cited are not very new. It could well be that a more modern literature review would have provided better direction to the authors. 2)this is not a case study by the more classical definitions of the case study. It is survey research. Unless the authors can show conclusively why this should be viewed as a case study, the words should be stricken from the title.